



200+

August 2014
Issue 405



FREE SOFTWARE

Create and edit music, free up drive space by eliminating duplicates, find free images for commercial use + more!

YOUR EXPERT

GUIDE TO TODAY'S TECH

UP & STREAM

Complete guide to efficient DVD and Blu-ray backup for storage and streaming

CREATE

THE ULTIMATE HOME MEDIA JUKEBOX

BUILD THE PERFECT HUB FOR YOUR TV SHOWS, MOVIES AND HOME VIDEOS – AND STREAM THEM ALL TO ANY DEVICE!



IS THIS THE PERFECT LOUNGE ROOM PC?



RATED

TITANIC NAS BOXES

Get mammoth media storage to house all your flicks, TV and music!

HANDS-ON HOW-TOs

- Open any file in iOS
- Block ads on your Android
- Master Mac automation

DIY ENIGMA

Recreate the fabled Nazi German cipher machine with an Arduino

Future

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Can a move spark a **transformation?** See it happen with System x.

You've probably heard that IBM® and Lenovo have entered into a definitive agreement where Lenovo plans to acquire the IBM System x® server business! This is big news, and it is natural for clients to have a few concerns. This letter from all of us on the System x team is to assure you, our clients, that this strategic collaboration is a benefit for the industry and especially for you.

Perfect Collaboration

Both IBM and Lenovo are dedicated to a larger vision for x86 systems. IBM has long been a leader in client focused innovation of System x servers and solutions, featuring Intel® Xeon® processors. Lenovo is committed to x86 computing and has a proven record of success, as evidenced by their #1 share position in PCs. By leveraging their strengths in scalability, operational efficiency and a broad channel presence, Lenovo will be able to ensure uninterrupted delivery of the innovative System x servers and solutions that IBM offers today.

This will create the winning combination to make System x a leader in the x86 segment.

Working for you. Always.

Our respective commitments mean you can continue to rely on getting the performance, reliability, and return on investment you expect for your IT infrastructure. Our team has always been dedicated to delivering exemplary levels of service. We are happy to inform you that IBM will continue to service the System x installed base for an extended period after the transaction closes, so you experience the same quality and accountability that you have come to trust over the years. What's more, we – the 7500 members of the IBM team that delivers System x servers – will continue to do the same, as we will also move to Lenovo.

At IBM, we have always been proud of our ability and commitment to meet the needs of our clients. This announcement opens new avenues for us to expand and improve on this tradition.

Please do visit ibm.com/futureofx/au to learn more about this development.

Sincerely,

The entire System x Team



apc

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My media PC odyssey

APC's editor admits it: he loves his media PC.

It's true: I've been a long-time convert to the media PC – although it's only recently that I've been satisfied with what the one I actually have. Well, for now.

My first 'media PC' was in fact an original Xbox running Xbox Media Center (XBMC) hooked up to a widescreen CRT TV. Though it's positively archaic by today's standards – and can't even handle x264 video at 720p – at the time it made for a cutting-edge media player that predated mainstream models hitting the market by over half a decade. XBMC did some amazing things that I still marvel at – it went so far as to let you adjust the video frame rates and audio pitch in movies and videos, meaning my Aussie DVD's (with their footage sped up to match PAL's 25fps rate, instead of the original 24fps they were shot at) finally didn't sound slightly too-high pitched any more.

Over the intervening decade or so, my media PC has morphed significantly; I've used Shuttle mini machines, tower cases turned on their side and dedicated home-theatre PC cases that have ballooned out into real tanks that weigh 20kg thanks to all the graphics cards and hard drives stuffed inside. (If there's one thing digital media demands, it's lots of storage space.)

I've spent countless hours not only with the hardware, but

perfecting and fine-tuning the software side of things too – I've experimented with more than one media manager in my day, and had the odd dalliance with a strange media player too. (And don't get me started on how much time I've spent getting a universal remote to work with Windows. It can be problematic – let's just say if you run into problems, look for the 'debounce' registry hack on Google.) I've even (shockingly) tried out a few dedicated network media players, like WDTV and Apple TV.

But I always end up coming back to the PC – and XBMC is still my favourite front end. And while my current media box certainly handled anything I throw at it, I'll readily admit that there's always room for improvement. In fact, I'm already planning to replace the current micro-ATX rig with something even smaller – a mini NUC strapped to the back of the telly, ready to stream movies directly from the web or pulling media from a library hosted on a NAS.



DAN GARDINER

EDITOR

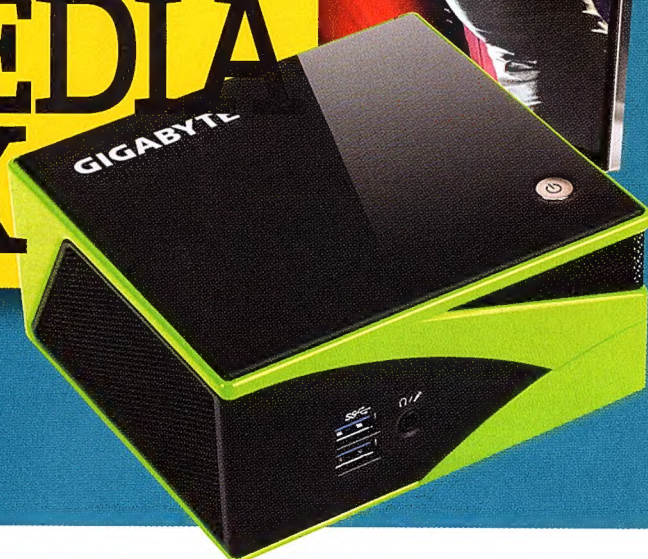
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THEM ALL TO ANY DEVICE!



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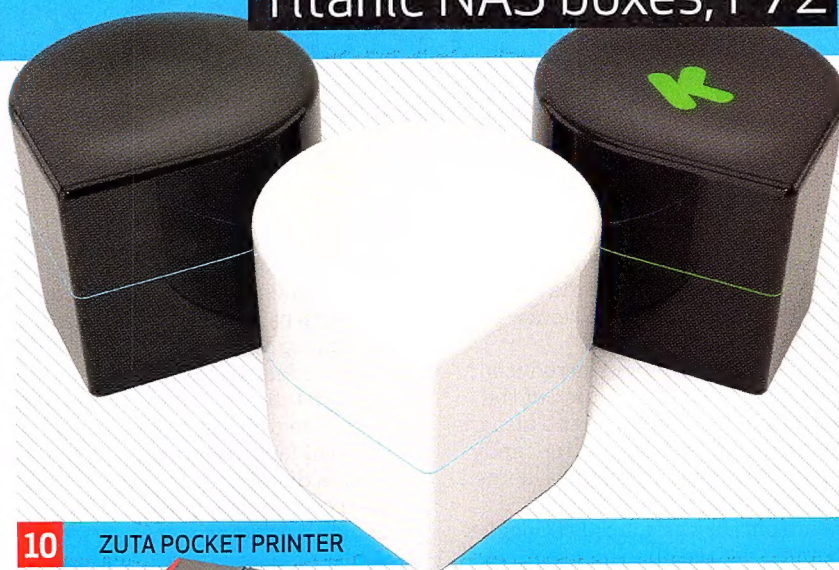
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Not everything is plain sailing in the tech world.

Where once they were clunky boxes that you needed dual degrees (in networking and storage) to set up, NASs have become far more user friendly”
Titanic NAS boxes, P72



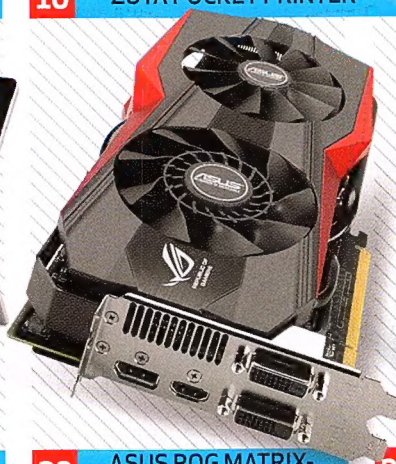
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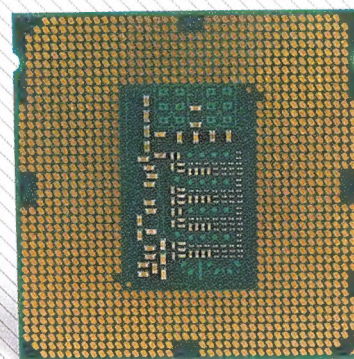
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technotes

» NEED TO KNOW

Android heads everywhere

Everything you need to know about Android from this year's Google I/O conference.

It looks to be the year of Android, with Google's I/O conference showcasing the popular mobile OS infiltrating your home, your car and even your wrist.

To begin with, Google introduced Android L, the latest version of the search giant's iOS rival – and also the first to drop the penchant for candy names (it was rumoured to be named Android Lollipop).

Android L is version 5.0 of Google's OS and is geared up to focus on performance and design optimisations for a much more consistent UI experience across Android and Chrome OS, with a new grid-based layout for easier portability for different sized devices. Finally.

Notifications get a big overhaul with integration on the lock screen. Swiping down will let you read the entire notification without needing to unlock your device, while you'll also be able to interact with the notification when you're within an app.

Speaking of lock screens, your device will unlock with a simple swipe whenever there's a Bluetooth-connected device nearby, otherwise the screen will prompt you to unlock your device as normal.

Moving from your pocket to your wrist, Google's smartwatch platform, Android Wear, made its official debut at the conference. It's able to support different screen shapes like circular and square, and incorporates Google Now functionality in order to be able to show you relevant information.

Android Wear uses a similar cards design to Google Now as well, which you can swipe, tap or press for moving between cards, dismissing them or pulling up options for them.

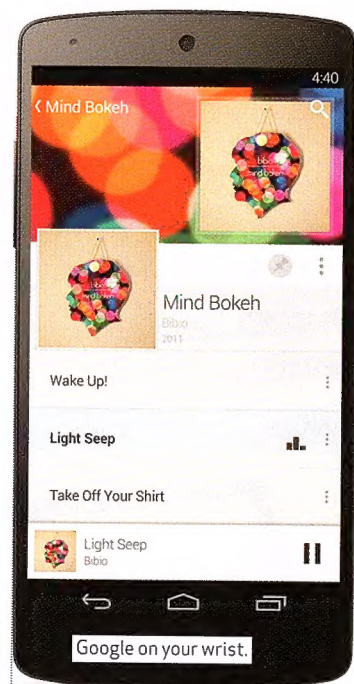
It also features voice integration, so you can tell your device to do a quick Google search, set up navigation on Google Maps directing on to your Wear device, dismiss an app on your smartphone or set up a reminder. Google Wear touting LG G watch and Samsung Gear Live are available in the US, while Moto 360 will be out later this year.

On the home front, Google has rebranded its failed Google TV platform to Android TV, which now offers a smoother UI experience. Voice search is also extended beyond movie and TV titles to things like actor names or "Oscar nominated films".

Apps will also be available on Android TV, along with native game support and a store specifically for the TV platform. The platform will get Google cast support, so it can be used like a Chromecast as well.

And speaking of Chromecast, the app-streaming dongle now officially gets Android device mirroring, which matches current Chrome browser mirroring functionality as well as the iOS Apple TV mirroring capabilities. This means that anything on your smartphone and tablet can be mirrored directly to your TV.

Finally, like Apple, Google is also getting into the car space (beyond its driverless vehicles) with Android Auto,



which casts your Android smartphone to a dashboard screen. The system supports steering wheel buttons, console dials and touchscreen, though all the apps run off of your phone.

What this means is that you won't need to update the entire system as, with each Android OS update, the Android Auto component will reflect the OS upgrades. It also means Google Maps can be fully integrated into your in-car system.

Other accessible apps on Android Auto include Google's contacts, messages, reminders and music services. ■ Farrha Khan



Australian government to increase digital surveillance?

Reports are emerging that the Coalition government could be looking to grant the Australian Security and Intelligence Organisation (ASIO) new digital surveillance powers, along with a mandatory data retention regime.

This follows recommendations made by the Parliamentary Joint Committee on Intelligence and Security back in 2013 in relation to potential reforms of the National Security Legislation.

It was recommended by the committee that ASIO be given powers to monitor networks that a target's computer is being hosted on, disrupt the target's computer and use third party computers to access suspicious networks and computers.

The committee also found that mandatory telecommunication data collection – which would force ISPs to collect customer data – would help law enforcement agencies. The scheme was initially presented by the government almost two years ago, but was criticised due to privacy concerns and treating citizens like criminals.

The government is currently seeking recommendations relating to the above report made by the Intelligence and Security committee, as well as on a report regarding privacy laws and practices in Australia.

Gamers no longer fit the stereotype

A new study commissioned by Twitch is suggesting that gamers are now a more diverse and social group than old stereotypes would lead you to believe.

The study surveyed more than 1,000 people about their gaming habits. Those who had played a game within the past 60 days on a digital device was defined by the study as a "gamer".

Headed by consulting firm LifeCourse Associates, though the study found that gamers were only slightly more likely to have fulltime jobs than non-gamers, the differences between the groups grew regarding social habits.

Only 35% of non-gamers agreed with the statement "My friends are the most important thing in my life", while 57% of gamers agreed with it. The study also found that more non-gamers live alone.

Gamers are also now more evenly split between genders – 52% of those surveyed were male and 48% were female. In comparison, a study from 2004 had found that only 40% of gamers were female.

Fake reviews cause real fines

The Australian Competition and Consumer Commission (ACCC) is seeking to fine another web site for having fake testimonials online.

The ACCC is alleging that a contractor posted fake reviews of Electrodry as the company's agent or at its direction on numerous sites including Google and True Local, rather than having been written by genuine customers. It is also alleging that Electrodry attempted to encourage other franchisees to also write false and misleading testimonials about it.

The ACCC is looking to fine Electrodry, as well as seek declarations, injunctions and corrective notices.

If found guilty, Electrodry, a carpet and upholstery cleaning company, would be the third company to face penalties. Australian removalist Citymove was fined \$6,600, while Euro Solar and Worldwide Energy and Manufacturing paid a combined fine of \$125,000.

It didn't end there, however, as Nikunj Kumar Patel, the sole director of both companies was also fined \$20,000 due to his involvement.

RecentOldestPositiveNegative

kimic67

1 review

★★★★★ Very happy with the service recieved!!!! The technician was very friendly and helpful. Carpet went from tired dirty to looking brand new!!!! Will definitely use again!!!!

1 MONTH AGO - 23/05/2014

COMMENT REPORT SHARE HELPFUL?

PeterThompson

1 review

★★★★★ Great Service. Arrived ahead of schedule. Brought my dirty 14 year old Lounge back from the brink. Not a mark left on it. Instead of selling it I'm keeping it! Dedicated and efficient. Will definitely use them again.

1 MONTH AGO - 13/05/2014

COMMENT REPORT SHARE HELPFUL?

KGGRIFFE

1 review

★★★★★ Electrodry was excellent. Anthony the technician was punctual, friendly and very knowledgeable. The carpets look brand new. I will strongly recommend Electrodry to friends and family.

2 MONTHS AGO - 28/04/2014

COMMENT REPORT SHARE HELPFUL?

chris/viv

1 review

★★★★★ Pete the technician came and cleaned our carpets and upholstery, all came up like brand new and felt like walking into a new home, service was more than we expected, very reliable, inexpensive, Pete told us what he was going to do and expected results but they came out better. Top service and highly recommended.

2 MONTHS AGO - 18/04/2014

COMMENT REPORT SHARE HELPFUL?

BrianaBubbles

1 review

★★★★★ The guys who came out to my house today we're so lovely. They were very friendly and accommodating to my needs. They were helpful in understanding the email/invoice I would receive. Along with the carpets came up beautifully. The house smelt lovely and the stains in the carpets came out :) I was very impressed with ... Read more

2 MONTHS AGO - 10/04/2014

COMMENT REPORT SHARE HELPFUL?

crazy odie

1 review

★★★★★ Peter was prompt, professional and very personable delivering a carpet cleaning service we were more than happy with. We would not hesitate to recommend him or Electrodry and will use them again in the future.

3 MONTHS AGO - 04/04/2014

COMMENT REPORT SHARE HELPFUL?

Jordann

1 review

★★★★★ Fantastic Service! Had our carpets cleaned the morning after I rang at a great price! And stains were removed that we didn't think were going to be possible to get rid of! Very happy all round!! Highly recommended!!!

3 MONTHS AGO - 02/04/2014

COMMENT REPORT SHARE HELPFUL?

Brittneycharie

1 review

★★★★★

3 MONTHS AGO - 02/04/2014

COMMENT REPORT SHARE HELPFUL?

220 MILLION

Sony has around 220 million Walkmans.

The Sony Walkman turned 35 in July, and since 1979, the Japanese company has sold around 220 million Walkmans — in all of its guises — and it's still selling them today.

Sony saw the rise of the Walkman with cassettes, which easily transitioned into the CDs format with the Discman.

Things didn't go so well when it tried to move to the unpopular Minidisc format, but it joined in with the MP3 crowd. Sony made its last tape-based Walkman in 2008, but it still sells and makes Walkman branded digital media players ranging for below \$100 to about \$700.



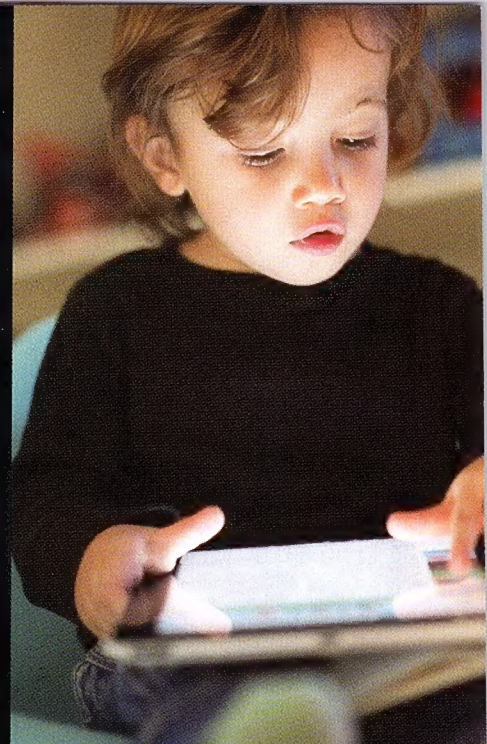
40 hours

Aussies aged 18-54 spend more than 40 hours on the internet.

A study by Roy Morgan Research has found that the X and Y generations spend the most time online in a month — an average of 40 hours and 21 minutes. While this may not be surprising, what may be unexpected is that people aged 55 years and over spend more time online than teenagers.

Those nearing retirement spend a little over 32 hours and 12 minutes online while teenagers aged 14-17 spend an average of 14 hours and 42 minutes on the internet.

Of course, these teenagers used the internet mostly for entertainment purposes (90% of internet use), adults were found to be using the internet more for shopping, banking and finance.



45%

Aussie kids aged 3-15 spend up to three hours on a mobile device per day.

A new study from Trend Micro Australia has shown that 64% of children aged 3-7, 63% of kids 8-11 and teenagers aged 12-15 either have their own mobile device or use their parents. The study found that these children are spending up to 3 hours per day on a mobile device.

This may be due to the fact that mobile device ownership is starting quite young also, with a third of 8-11 year old owning their own device.

While 46% of the parents say that their child is using mobile devices for apps and games, 24% of the parents say that it is being used by their kids for learning and education.

90%

The majority of people spied upon by the NSA were not targets.

A report from *The Washington Post* alleges that 9 out of 10 people spied on by the NSA were not the intended targets of the surveillance. This means that while the NSA Transparency Report says the NSA had 90,000 targets in 2013, it was actually spying on 810,000 people last year.

This is based upon intercepted conversations from 2009 and 2012 and include emails, instant messages and social media messages. The report also claims that half of the people spied upon were US citizens or residents.

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GIGABYTE 9 Series
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Motherboards



* FOR BLACK EDITION ONLY.



technotes

» GEAR WE WANT



SKYLOCK

US\$249 | WWW.SKYLOCK.CC

Here's another piece of integrated technology you didn't know you needed. The Skylock is a bicycle lock with a difference; instead of a key, you unlock it using a smartphone app. It can even unlock itself as you approach, without you reaching for your phone at all. It can also send a message to your phone if your bike is disturbed. It even has solar panels to keep the battery charged. It's designed by ex-Boeing and Jawbone engineers to resist all attempts to break it. Expected to be available early next year.

PARROT BEBOP DRONE

\$TBA | WWW.PARROT.COM

Parrot's smartphone-compatible flying machines get more capable with every new release. The Bebop Drone boasts a 14 megapixel fisheye-lens front-facing camera that records video in full HD (1080p) and streams a live feed to the phone or tablet you're using as a controller. It uses Wi-Fi 802.11ac on both the 2.4GHz and 5GHz frequencies for a claimed Wi-Fi range of up to 2km using its dedicated controller. (Honestly, where would our Gadgets section be without these crazy, iOS-controlled devices?) Comes in to land in late 2014.



TOWLHUB

US\$50 PLUS SHIPPING | WWW.TOWLHUB.COM

We guess they don't call them 'Universal' Serial Bus ports for nothing. USB sockets are basically everywhere nowadays, but even so, this one took us all by surprise. TowlHub is a spindle for a kitchen roll, with four integrated USB ports in the base for charging your mobile devices. It's available with optional Bluetooth speakers too, so you can stream your sounds from your mobile while you charge it. Plus, the knob on the top of the spindle can be removed and used as a wine stopper. This must be the weirdest fusion of a mundane appliance and unnecessary tech we've seen since the infamous iPod-compatible toilet roll holder. It's bizarre, but we like it. Not enough to buy one, of course, but we can't help finding it amusing.

RAZER ANDROID TV MICRO-CONSOLE

\$TBA | WWW.RAZERZONE.COM

With Google's recently announced Android TV platform looking to (once again) put the search giant in your lounge room (see page 6 for more details), Razer was one of a few companies to jump in and proclaim that it was building a box based on the budding platform. Details are scant at this stage, but Razer is dubbing its particular product a 'micro-console' that will be designed by the team behind its Blade laptops and have enough horsepower to support both hardcore and casual gaming alongside the planned movies, music and web functionality at Android TV's core. They're expecting the device to see release in the US in fall (i.e. spring down here) but there's no word yet on a local release date.

ZUTA POCKET PRINTER

\$TBA | WWW.ZUTALABS.COM

If you think all printers are the same, think again. This pocket-sized peripheral from Israeli developer ZUtA Labs takes a whole new look at the inkjet. Funded on Kickstarter, it's portable (100mm tall and 110mm in diameter), and works by driving itself over the page while it prints — take a look at the video on ZUtA Labs' web site to see it in action. The prototype prints at 1.2 ppm at up to 96 x 192 dpi, though these figures might well improve by the time it reaches the shelves. The first-gen ZUtA will be greyscale only, but colour versions are planned. This one's currently still in development, with the release date to be announced.



STEAMBOY

\$TBA | WWW.STEAMBOYMACHINE.COM

We've already sort of got a Steam handheld console by way of Nvidia's Shield, which can stream games from your desktop PC over Wi-Fi (though the Shield still isn't officially available in Australia). Now an independent team is looking to build a slightly more robust Steam-powered portable with the Steamboy, which will run Valve's Linux-based Steam OS and pack a quad-core CPU, 4GB RAM and 32GB of built-in storage with a 5-inch (16:9) touchscreen. That should be enough to run many games on low or medium details at playable frame rates — and of course, there's always the option to stream from your desktop rig if you're within wireless range. At present, this one's still a bit of a pipe dream, but consider our interest piqued. ■





Clad in white and green, the MSI ECO motherboard includes custom software and hardware options designed to get the best efficiency from low power systems.



Using Intel's new Core M CPU, the ultra-thin 12.5-inch ASUS Transformer Book T300 Chi is a detachable laptop running Windows 8.1 with a 2,560 x 1,440 IPS screen.

THE TECH TRENDS OF 2014

Lindsay Handmer scopes out the latest PC technology and trends on the floor at Computex.

Held in Taipei, Taiwan, Computex is an opportunity for manufacturers large and small to showcase their latest products and gives sneak peeks at upcoming technology. Each year the convention has an underlying theme of what's hot. 2014 was all about mobility, with row after row of Android tablets, wearable devices and ultra-portable laptops. Both Intel and AMD showed prototype devices, while Dell, ASUS, HP and more had endless convertible laptop tablet hybrids. Phones are getting bigger and cheaper, while gaming laptops have gone on a serious diet. 4K screens were also in abundance, in everything from standalone monitors to laptops and tablets. Smaller desktop PCs were also prevalent, with fanless pre-built mini PCs to hard-core yet compact DIY mini-ITX gaming machines.

While Computex is dominated by big showy products, hidden in the noise were some telling technologies that are you can expect to see in the upcoming PCs. USB spec 3.1 was on display, along with some interesting external PCIe technologies. Intel and AMD were showing off the latest CPUs,

including exciting developments in the mobile space. DDR4 made more than one appearance, along with the upcoming Intel X99 chipset. Green technologies were prevalent, with manufacturers such as MSI displaying an ECO friendly motherboard. AIO computers are becoming increasingly popular, with high end specs, gaming models and even 4K screens available in the future. There was also some interesting flexible battery technologies that could allow your next wearable device much longer run times. Read on to find out what new technologies will be shaping your next PC and beyond.

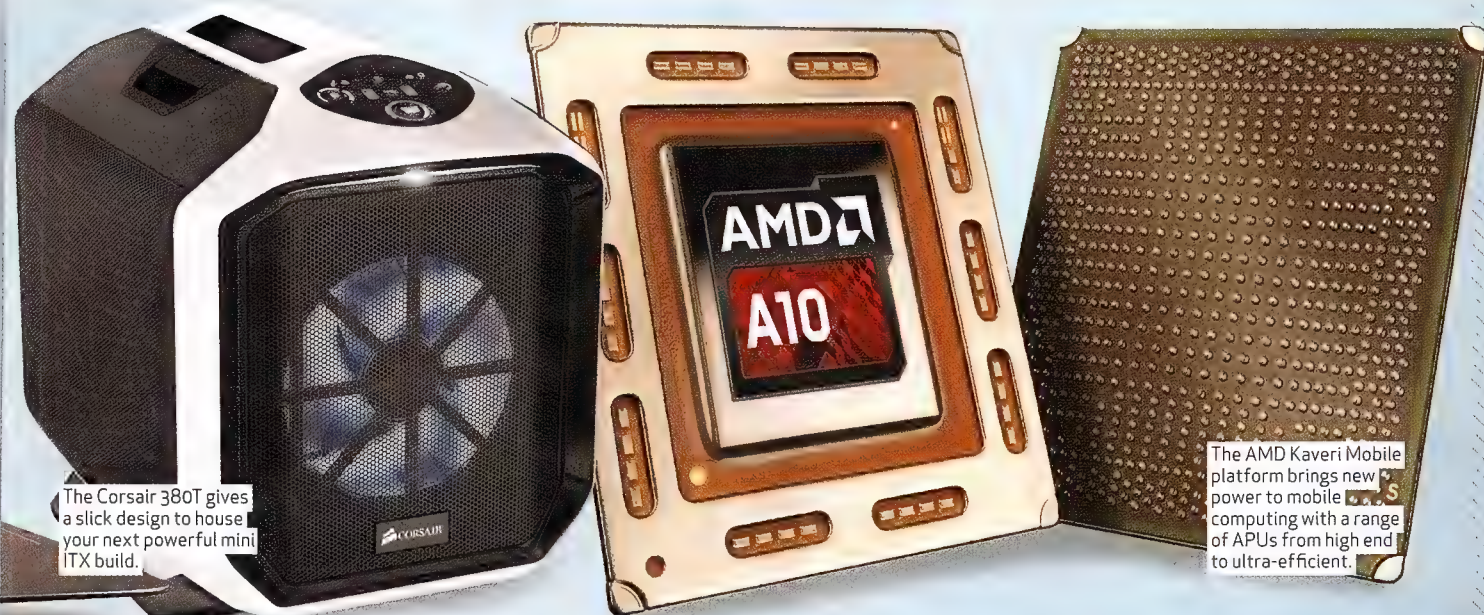
TICK TOCK

Not surprisingly, Intel dominated the CPU announcements. The new Devil's Canyon i7 4790K and i5 4690K CPUs launched, with the former already overclocked to a massive 7GHz. Those who were hoping for Broadwell devices will be mostly disappointed, with only a few on display. The much awaited 14nm die shrink of the Haswell architecture won't be mainstream until 2015, with devices such as the Microsoft Surface Pro 3 using the older 22nm CPUs. Intel's low power Core M



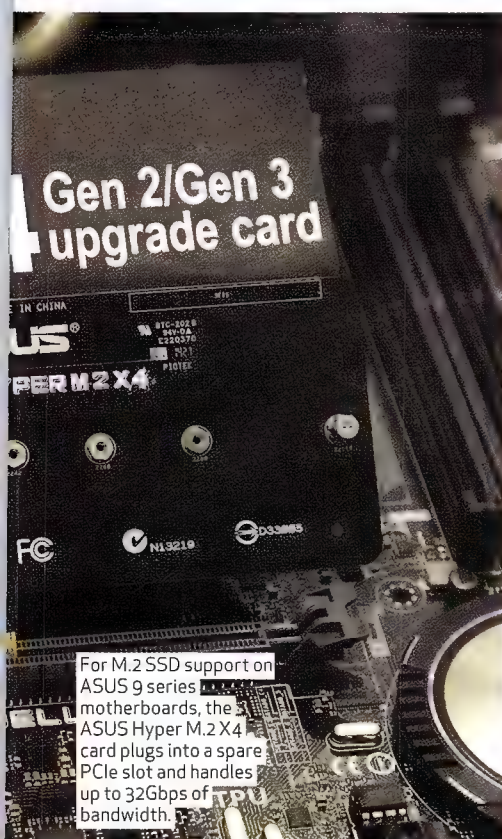
processors made a few appearances — notable in a prototype convertible tablet just 7.2mm thick. Interestingly the efficient processors allow it to run fanless when used as a tablet, but fans in the docking keyboard allow performance to be boosted by 30%. Intel's Moorefield CPUs were also on show, bringing fanless 2.3GHz quad core power to mini PCs and portable devices alike.

AMD also had new announcements, with one of the most interesting and potentially underrated new CPU technologies at the show — Kaveri



The Corsair 380T gives a slick design to house your next powerful mini ITX build.

The AMD Kaveri Mobile platform brings new power to mobile computing with a range of APUs from high end to ultra-efficient.



For M.2 SSD support on ASUS 9 series motherboards, the ASUS Hyper M.2 X4 card plugs into a spare PCIe slot and handles up to 32Gbps of bandwidth.

Mobile. AMD launched the desktop version of Kaveri back in January, combining the latest CPU and GPU technology into one compelling gaming capable APU. Kaveri Mobile gives AMD a powerful new APU that can take on Intel and NVIDIA in the laptop and gaming laptop categories. Kaveri also handles 4K screens, both for laptop and driving extras such as TVs. Importantly, Kaveri is not just targeting mid-range laptops — AMD claim the more high end FX-7600P APU with Radeon R7 graphics can compete on an even footing with Intel's mobile

"It's possible we could see a 23.6-inch 4K computer monitor for under \$500 early next year."

i7 CPUs. Efficiency is also a concern, with Kaveri mobile focusing on extending your battery life.

THE NEED FOR SPEED

Catering to our desires for faster HDDs, speedier memory and more bandwidth to external devices, manufacturers were showing off a range of new solid state and connectivity technology. MSI had what they claim is the world's first USB 3.1 motherboard (although ASUS had one too), coupling two PCIe 2.0 lanes to an ASMedia controller to give 10Gbps transfer rates. Despite doubling the data rate of USB 3.0, it isn't likely to be mainstream for quite some time. SATA Express will be in your next motherboard if it isn't already, giving support for super-fast next gen drives. M.2 also lets you add compact SSDs directly onto your motherboard, with data rates up to 10Gbps. Many motherboards don't have M.2 support, so ASUS was showing off an upgrade card called Hyper M.2 X4 that plugs into a PCIe port.

The already launched Intel Z97 chipset was on show from many manufacturers, but we also got a sneak peak at the upcoming X99 chipset. Manufacturers such as MSI, ASRock and EVGA all had prototype X99 motherboards. Supporting the upcoming Haswell-E 6 and 8 core CPUs, the new chipset's real showpiece is DDR4 RAM. The new memory will increase bandwidth by 50% while lowering power consumptions.

X99 will also support 10 SATA 3.0 ports, 8 PCIe 3.0 lanes and better overclocking. Start saving now as Intel has X99 motherboards scheduled for release in late 2014.

THE 4K FUTURE

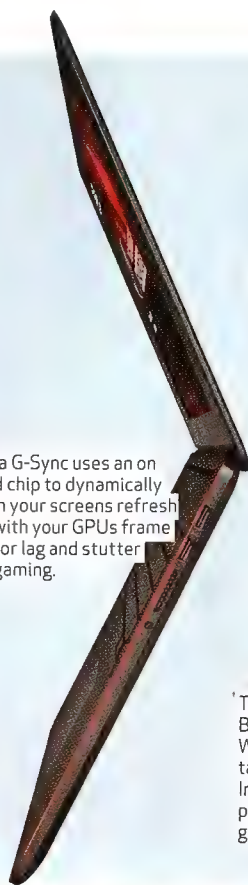
Already semi common in TVs, 4K resolutions are set to become the new computer monitor standard. Only ASUS and Acer had standalone 4K monitors on display at Computex, though a number of laptops already have 4K screens. The 4K resolution that's fast becoming the default is the same as used in TVs — 3,840 x 2,160, or 4x 1,920 x 1,080. This gives a 16:9 aspect ratio, whereas the industry standard outside of TV is 4,096 x 2,160, with a 1.9:1 aspect ratio. Technically dubbed Ultra HD, these slightly sub 4K resolutions are here to stay, as they allow easy sharing between PC and TV technology.

With high prices and limited use, many computer users are underwhelmed by the prospect of upgrading to a 4K screen. With last years CPUs still very capable today, Intel is keen for users to have a reason to upgrade to their latest 4K capable hardware. To help move along adoption, Intel and Samsung are collaborating to bring down the price of 4K screens — especially smaller models. For now it's little more than speculation, but it's possible we could see a 23.6-inch 4K computer monitor for under \$500 early next year.



The 19mm thick ASUS GX500 has a 15.6-inch 4K 3,840 x 2,160 screen, an i7 CPU, GeForce GTX 860M GPU, 16GB of RAM and Bang and Olufsen audio.

Nvidia G-Sync uses an on board chip to dynamically match your screen's refresh rate with your GPU's frame rate for lag and stutter free gaming.



The ASUS Transformer Book V is a detachable Windows and Android tablet and laptop, with an Intel powered Android phone in there as well for good measure.



"Thanks to smaller, more efficient hardware, gaming laptops have been reborn into ultra-thin and light machines."

One issue with 4K gaming is vertical tearing and stuttering of the image as your GPU frame rate changes. AMD FreeSync and NVIDIA G-Sync technologies promise to resolve these issues in your next monitor upgrade by dynamically varying your screen's refresh rate to match your game's frame rate, giving a very smooth and immersive gaming experience.

GAMING ON THE GO

Thanks to smaller, more efficient hardware, gaming laptops have been reborn into ultra-thin and light machines that rival ultrabooks. For now all the thin gaming notebooks use a combination of Intel CPUs and NVIDIA GPUs — but hopefully the AMD Kaveri Mobile APUs will arrive soon. The latest efficient NVIDIA GeForce 800 series GPUs offer a battery boost mode which can double the time you can game on battery power. Intelligent management of CPU and GPU boost speeds help keep your laptop within its cooling spec, yet give you extra grunt when you need it. The trend here is also to ditch the optical drive, as more and more gamers download new titles. You can

expect 1080p screens at a minimum, with many models opting for higher resolutions or premium IPS screens. M.2 SSDs, USB 3.0, backlit keyboards and 802.11AC Wi-Fi are now pretty much standard. The major manufacturers such as MSI, Gigabyte, ASUS and AORUS all had ultra-thin gaming laptops on display, most of which will make it to Australian shores by the end of the year.

Of course the behemoth laptops still exist — now even more powerful. MSI's latest 17.3-inch gaming laptop is the GT72. Full details are not yet available, but expect a high end Intel CPU and GeForce 800 series GPU. Traditionally chunky manufacturer Clevo (who builds the underlying laptop for big names such as Alienware) also had some slimmed down models, but still expect power over portability.

HYBRID FUTURE

In the never ending quest for the perfect combination of laptop, tablet and phone, a stream of good, bad and just plain ugly hybrid devices were on display. Doing it right and demonstrating that a tablet can also

be a very usable laptop, Microsoft showed off the Surface 3. Dell opted for a folding stylus compatible touchscreen hybrid, while HP rotated, detached and flipped laptops into tablets. ASUS has taken the concept to the extreme with the Transformer Book V, a Windows laptop that can detach into a Windows tablet, or run as an Android laptop or tablet with a removable phone. It sounds mad (and it is) but at the same time shows off some great combination technology, not to mention Intel's Moorefield mobile CPU. Perhaps ASUS takes it too far, but detachable touchscreen hybrid laptop and tablet devices have a bright future, giving the best of both portability and usability. As much as we like Android and Windows on the one device, they are unlikely to become common as neither Microsoft and Google are reportedly keen to share. There is also a new breed of laptop that crosses over between gaming and productivity, such as the ASUS Zenbook NX500. Featuring capable mid-range GPUs and less outlandish looks, these ultrabooks let you get in some casual gaming after work.

Whether you like it or not, phablets are a thing, and phones continue to grow, with massive 5.5-inch+ screens with HD or better resolutions. They also feature more and more powerful CPUs, giving stealthy competition to small tablets.

The weird & the wonderful

HIDDEN AMONGST COMPUTEX'S BIG ANNOUNCEMENTS AND SLICK PRODUCTS ARE A RANGE OF QUIRKY, INTERESTING AND JUST PLAIN AWESOME NEW DEVICES AND TECHNOLOGIES. WE'VE ROUNDED UP FIVE OF OUR FAVOURITES THAT STOOD OUT FROM THE CROWD.

BIOSTAR BITCOIN MINING

For those interested in Cryptocoins, BIOSTAR has built a motherboard with mining in mind. The Hi-Fi H81S2 has 6 PCIe slots, extra power plugs and optional PCIe 1x to 16x powered extenders, to make setting up a bank of GPUs easy. The motherboard uses the Intel H81 chipset and supports LGA 1150 CPUs. For those who want a more professional setup, BIOSTAR is the only motherboard manufacturer to also produce a standalone ASIC mining solution. Equivalent to 30 ATI 7970 GPUs, the 24GH/s hashing on offer is now behind the times, but it's still very interesting.

LIAN-LI DK-02

Why put a PC case on or under your desk, when it can be your desk? The Lian-Li boffins have built a stylish brushed aluminium desk with glass top that can hold and display not one but two PCs. One machine has to be Mini ITX, but you also still have room for up to 20 HDDs. It can also swallow videocards up to 400mm long, or 300mm long on the second PC. Cooling is handled by 8 120mm fans with dust filters. You also get an aluminium keyboard tray, headphone hooks and front mount USB and audio ports.

NOCTUA NOISE CANCELLING CPU FAN

For those who enjoy their peace and quiet, noisy computer fans have a particularly annoying sound. Designs to passively minimise noise can only go so far, so Noctua has built a CPU fan that actually actively cancels out its own noise. The fan uses a special electromagnet around the edge of the fan housing, with magnets in each fan blade tip. As it spins, the electromagnet is pulsed to create vibrations in the fan blades that cancel out the noise they produce. While not totally silent, the fans are noticeably quieter in operation. Still in the prototype phase, we look forward to these quiet fans being in our future PCs.

The ASUS GR8 straddles the line between mini PC and console.

ASUS GR8

Casual gaming just got a new face, as ASUS launches a gaming mini PC in a 2.5l form factor. Aiming to be a sort of PC console crossover, the GR8 will feature an Intel Core i7 CPU paired with an Nvidia GTX 750 Ti and 8GB of RAM to give mid-range gaming performance. You also get AC Wi-Fi, Gigabit LAN, 5.1 surround sound audio and a 1TB HDD or SSD. Video output is via HDMI with 4K support and you also get 4 USB 3.0 ports. Shipping with Windows 8.1, it's rumoured a SteamOS option will also be made available.

2015 FORD MUSTANG

The technology packed Mustang was right at home in the Computex halls, as Ford gave virtually enhanced tours of the features with Google Glass. The new Mustang features Ford's latest SYNC and AppLink technology — giving voice control, the ability to run apps on your car and access data from the sensors. You can set up custom driving modes set to specific keys, control the dash light colour and in a severe accident the Mustang will even call emergency services and give your GPS location. It's also got adaptive cruise control, keyless entry and start, collision warnings and blind spot tracking. Ford was also demoing a prototype car-to-car communications technology that can talk with other vehicles to warn of potential accidents. ■

Adding a bizarre new layer to road rage, now your car can tell other cars to back off!



technotes

OPINIONS

SCAM ON A SCAM

Could you please tell me if you know of any current incentives by the Nigerian Government, through the United Nations, to compensate recognised victims of scamming operations emanating from Nigeria? I have recently received an e-mail supposedly from their Security Department, stating that I was one of many people listed as victims of Nigerian scammers. They are offering me monetary compensation in the form of an International Debit card to be used in Australia. They have rung me a couple of times to confirm my interest in this initiative. They also require that I send \$105 to Nigeria to cover security shipping to my address. Is this in fact a legitimate offer – or is it just another scam on a scam? I tracked the emails to both Redmond, Washington, and Sunnyvale, California; both well known scammer hot-spots. Please advise what you think.
Clifford Perrin.

Ed replies: Stay away! Though the wording might be a little different, this is still a textbook Nigerian '419' scam – a form of advanced fee fraud where you're promised that, for a small fee, you can help 'unlock' a larger amount which the fraudster will happily share with you. Of course, once you fork over the initial amount, problems arise that require a little more money to bribe some officials and get access to that cash. Our advice? Either report it to the ACCC at www.scamwatch.gov.au, or mark the email as spam and move on. Do not send any money!

GET A REAL NAS

Having seen an easy-to-use NAS reviewed highly in your magazine I unfortunately purchased one earlier this year. Although it performed as reviewed for a time, it developed a

nasty habit of frequently dropping out from my network, which after a glance at the web, apparently is not uncommon for this product. The vendor has proposed a number of remedies that have not worked, with the final yet to be faced, of backing up all of its content and reformatting the drive – with no guarantee of success. Return is inevitable but will another work correctly? My IT son originally sneered at the purchase, saying that I should get a real NAS – I think he was right!

Graeme Butler

LESSON LEARNED

I read with great interest Peter Henderson's letter in issue 404 (page 14). In his letter he described the problems he had after installing Linux Debian. Linux overwrote the boot sector of his hard drive resulting in no Windows 7. Now, I'm not boasting – well maybe a little. However, I recently considered installing Linux Ubuntu on my PC. Being an extremely cautious

"They also require that I send \$105 to Nigeria to cover security shipping to my address. Is this in fact a legitimate offer – or is it just another scam on a scam?"

person I decided to do the installation on an old no longer used laptop. When that machine died of old age part way through the installation process I again considered using my current PC. Fortunately caution over rode desire and I did not do so. Am I happy my old laptop died? No. Am I happy I did not use my current laptop? You bet! Am I grateful to APC for publishing Mr Henderson's letter?

Definitely! Why? Because now I know I am not an old 'stick in the mud' amateur computer user.

Terence Jacobson

PUMP IT UP

Upon installing Android x86 (November 2013) on my Dell Latitude E6500 everything is OK except the sound is very low. Can the sound be increased somehow?

Ray Germon

APCMAG@FUTURENET.COM

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The war on piracy

With Australia topping the list of countries downloading this season's *Game of Thrones* finale via BitTorrent, we're once again facing discussions about digital piracy in Australia. Farrha Khan investigates.

Foxtel had exclusive rights to season 4 this year, with iTunes, Quickflix and Google Play only being able to offer the series once the season finale was broadcast by the pay TV provider.

This meant that the only way to keep up with the series legally in Australia was to pay for a full Foxtel subscription or sign up to Foxtel Play (with a \$50 monthly charge in order to get access to the show).

Some viewers chose to pay for VPNs in order to access US geo-blocked services for a smaller fee than Foxtel — though whether this is illegal or not is still being argued in Australia. Many, though, simply chose to pirate the show.

iiNet's Chief Regulatory Officer Steve Dalby has been the most vocal on the issue, coming out to say that the focus should be "on the problems which have driven Australians to take their business elsewhere."

To combat digital piracy, the Australian Government (in particular Attorney-General George Brandis) is considering implementing legislation which could include a 'three-strikes' scheme or a graduated response scheme that would require ISPs to send infringement notices to customers as well as block sites. Interested parties and copyright holders like Foxtel and Village Roadshow, support this method as a way to help stop piracy.

But Dalby thinks maintaining a list of sites that will need to be blocked isn't a viable solution, nor does it solve the issue of piracy, while proxy services, VPNs and simply changing



Photo Credit: Phillip Lauer / blinkbox

DNS settings can be used to overcome blocked sites.

For Dalby, the answer to piracy in Australia is simple: "Making content available in a timely, affordable way will go a long way to tapping into the Australian willingness to pay for legitimate content."

He has also suggested getting rid of geo-blocks, and companies like Google have gone on record to say that they, too, believe online piracy and copyright infringements are mostly an availability and pricing problem.

Greens communications spokesperson Scott Ludlam has urged the Australian Competition and Consumer Commission to step in to stop monopolies on content for better availability for consumers.

But while Foxtel did lower prices for Foxtel Play subscription during the run of the latest *Game of Thrones* season,

however consumer advocate and advisory group Choice later came out to say that Foxtel itself was to blame for the piracy rate of *Game of Thrones* in Australia.

Like iiNet, Choice believes the government's proposed policies are draconian, "costly, which slow down internet speeds, and which ultimately fail to reduce piracy."

"That's why we're calling on the government and industry to address the real issues of online piracy: a lack of access to competitively priced and flexible content."

With digital piracy, there is no one answer. ISPs, content providers, the government and content creators will need to work together to combat piracy and promote more legitimate services that offer more of a choice to customers. ■

ENDUSER

Share your stories!

If you have an interesting story about technology users, their experiences and the issues that affect us all (whether funny or serious), email us at apcmag@futurenet.com. All correspondence becomes the property of APC and is subject to editing. Letters must include writer's full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.

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(shown)



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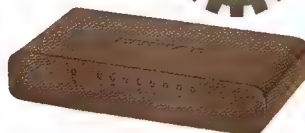
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- 8 x RJ-45 ports
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10/100Mbps N-Way Switch

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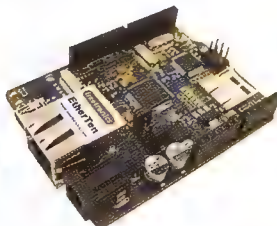
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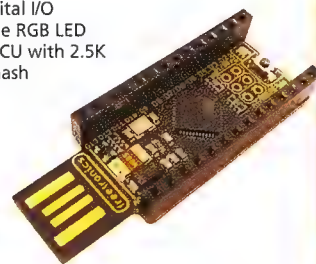
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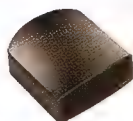
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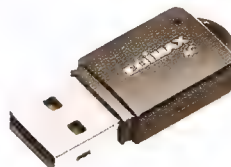
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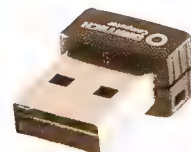


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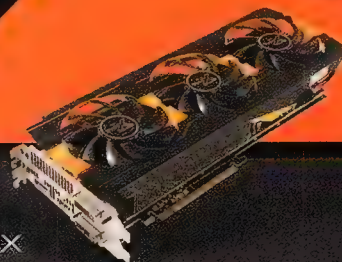
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Microsoft Surface Pro 3

A hybrid we'd take everywhere.

When the original Surface Pro launched, no one quite knew how to classify it. Was it a tablet that was trying to be a laptop? A laptop trying to be a tablet?

We're going to come right out and say the Surface Pro line is neither and doesn't need to be – particularly in the case of the Surface Pro 3, which combines the best of both worlds.

At just 800g (1.1kg with the optional Type Cover attached) and 9.14mm thick, it's one of the lightest, slimmest x86 ultraportables around. When thrown into a backpack it's barely noticeable. And given its generous size – a 12.1-inch, 2,160 x 1,440 IPS screen – it's a bit of a marvel that its internals include a Core i5-4300U CPU, 8GB of DDR3 RAM, and a 256GB mSATA SSD. And unlike its first-generation predecessor, it runs cool and, for the most part, very quiet.

Of course, there are trade-offs for cramming so much into so little space,

with the additional requirement of being cool and quiet. While it performed slightly better than our zero-point (the original Surface Pro), during intensive loads we saw a decrease in performance. We suspect this is due to the system favouring thermals over performance – a way of still improving on SPI's well-deserved reputation for running unabashedly loud and hot when pushed. Don't expect to play triple-A titles on the SP3 – or even farm league games; we barely cracked 16fps in *Batman: Arkham Origins*' benchmark. It did run the Little League-level *Super Meat Boy* at 50fps and *Limbo* at 29.4 fps, so there is some fun. Heavily threaded loads also are best left to beefier systems, as our ProShow 5 benchmark (which is limited to four threads) took almost an hour to complete.

But as a hybrid, the Surface Pro 3's hard to beat. With its multi-point kickstand, you can adapt it to a wide variety of scenarios, particularly when

combined with the updated Type Cover, which sports a magnetic strip that clings to the bottom edge to provide additional stability. We liked being able to do actual work – between its ample screen and 3:2 aspect ratio, doing daily tasks like writing articles, crunching numbers, and creating presentations are comfortable on the go – while also jumping to more tablet-like functions like watching Netflix, trawling YouTube, and reading magazines through Zinio (without having to zoom to read tiny text, to boot). Taking notes by hand via OneNote on the touchscreen is as good as in previous models. And its battery life is pretty good, lasting 4:03hr in our rundown test.

Our real quibble with this machine has not to do with its hybrid status, but with its accessories. Though the Type Cover's trackpad is vastly improved over the SP2's version, it can be a bit hypersensitive. It's also surprising that the Type Cover is still as expensive as it is; its street price is 10% of

the cost of our review unit. We're also not huge fans of the pen loop that holds the stylus, as we're pretty sure we'll lose the instrument due to the loop tearing or losing its adhesive stickiness in about a month.

Still, these are entirely minor complaints, and we're still more than happy to deal with them as part of being able to trade a few devices in our bag for just one. Haters are going to kvetch about how it's not what they'd spend their money on, but if you've been an ultraportable fanatic well before Intel began its Ultrabook push, you'll love just how much hardware is in this svelte form. ■ **Alaina Yee**

Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

Thin and light; multi-point kickstand; runs cool and quiet.





MINI GAMING PC

\$899 | WWW.GIGABYTE.COM.AU

Gigabyte GB-BXi5G-760

Desktop gaming chops in a palm-sized package?

The gradually emerging category of mini PCs has been gaining popularity since they first landed a couple of years back. However we've yet to see any that can tackle a real desktop when it comes to gaming performance. Gigabyte's new Nvidia- and Intel-powered BRIX Gaming unit seems to offer the promise of lounge room PC gaming in a box that's not much bigger than a cereal bowl (about 13 x 12 x 6cm). It's about a quarter the size of Microsoft and Sony's next-gen consoles, but is graphically more powerful, with a desktop-grade GeForce GTX 760 card physically reconfigured and squeezed inside the BRIX's tiny chassis.

What you're getting with the GB-BXi5G-760 is a mix of laptop and desktop parts. Actually, that GTX 760 is really the only desktop part

in there – the CPU is mobile (a Core i5-4200H), the BYO RAM sticks must be laptop SODIMMs and for storage you can insert either an mSATA or 2.5-inch SSD or hard drive. That gives it more than enough chops for any sort of general-purpose computing you can throw at it, and with an SSD installed for our testing (a 240GB Seagate SSD 600) it booted in five seconds flat and was lightning fast navigating around the desktop and launching and using productivity and entertainment programs.

You could easily use this as a capable little media box to re-encode movies on the fly to stream to your devices.

So what about gaming? That answer is a little more complex and largely boils down to that Core i5-4200H chip. This is a part usually found in laptops – it's a low-power, dual-core CPU that offers OK performance

and doesn't put out much heat. It's a far cry from what a desktop chip – or even a grunty quad-core mobile CPU – is capable of, though, and this means it can prove to be a gaming bottleneck. Compared to a GTX 760 in a desktop rig, the performance was universally lower – and particularly in the more CPU-bound *Metro: Last Light* and *Tomb Raider* tests. At 1080p with Medium details, the GA-BXi5G-760 limped along in *Metro* at a decidedly unplayable 18fps; its desktop counterpart managed 72fps. So while many games are playable at 1080p and maintain a good 60+ fps rate, there are titles that can bring this box to its knees.

It's also worth noting that doing any prolonged gaming will kick the unit's system fan into high gear. There's already a constant low level of fan noise even when just idling at the desktop, which ramps up quite considerably

when games get intensive. The top surface can likewise become quite hot to touch.

Gigabyte certainly deserves kudos for managing to squeeze a mid-range desktop graphics card into a box this petit – it's an interesting experiment that does somewhat live up to its promise. Even the price is OK, with higher-end Intel GPU-powered NUCs selling for around \$650 to \$700. Yet we can't help but feel that this would've been a more well-rounded package if it had been given a faster, quad-core CPU.

■ Dan Gardiner

GAMING PERFORMANCE

	GIGABYTE GB-BXi5G-760	NVIDIA GEFORCE GTX 760*	NVIDIA GEFORCE GTX 870M*
BIOSHOCK INFINITE	90.97	132.53	102.72
METRO: LAST LIGHT	18.67	72.5	63.67
GRID 2	88.61	143.82	107.07
TOMB RAIDER	63.4	160.8	114.6

* TESTED WITH INTEL CORE I7-3970X, ASUS P9X79, 16GB DDR3-1600 AND 200GB INTEL 710SSD. ^RESULTS FROM MSI GS70 STEALTH (2014) LAPTOP, WITH QUAD-CORE INTEL CORE I7-4700HQ CPU.

Verdict

Features
Performance
Value



Holds up well in many games, but an imbalance between GPU and CPU slightly throws things off.



"A tertiary, flaky method of interaction seems rather irrelevant."



LAPTOP

\$1,499 | WWW.HP.COM.AU

HP Envy 17 Leap Motion SE

A leap of faith into the future of gesture recognition?

While you might think it quite enjoyable to maintain a snarky disposition when it comes to new product releases, that's not actually why we got into tech journalism. Yes, it's more fun writing about something that's plain terrible than writing about something that's just adequate – but it's even more pleasing to write about a bit of tech that is genuinely worthwhile or exciting. That's why we do this; we're enthusiasts first and foremost, and want to be enthusiastic about things.

And that's why we wanted to look at HP's Leap Motion laptop – because we wanted to be passionate about it. Sadly, the gesture-recognition technology in the Envy 17 is less *Minority Report* and more *Ernest Does Tech Design*.

This version of the Envy 17 is a pretty standard 17.3-inch 1080p notebook, with a middling Core i7

mobile CPU housing eight threads and a decent Turbo frequency. It also has a discrete Nvidia GPU, though it is only of the GT 750M variety, so it has little to offer in gaming terms at full native resolutions.

The Leap Motion tech is really all there is to make this notebook stand out. The sensor is a black strip to the right of possibly the worst trackpad I've ever had the misfortune to use. The idea is that the sensor creates an area around the keyboard that can recognise your hand, including individual fingers, to offer gesture control for your PC. We found it very tricky to get a consistent response from the sensor, even after multiple calibrations.

For many of the Leap Motion apps, the sensor divides the area above the laptop into two areas: a hover zone and a touch zone. The hover zone tracks motion, such as the movements of a cursor,

while the touch zone is the area closest to the screen and is used to denote the pressing of buttons.

It's hard to know where each area begins and ends, which means there's a lot of trial and error, mis-clicks and random movements in-app.

The sensor will also sometimes lose track of your hand or fingers mid-way through an action, which means that using the machine is often a rather frustrating experience. We want gesture tracking and recognition to be effortless and, above all, consistent. The Leap Motion implementation on the Envy 17 is anything but that.

It's also suffering because Leap Motion is really a platform rather than a controller. It doesn't work on the applications you use on a day-to-day basis – only ones picked up through the Airspace store.

With touch becoming

ever more accurate – the screen on the Envy 17 is touch-ready and as reliable as you could wish – and the mouse still being the best option for fine-grain control, a tertiary, flaky method of interaction seems rather irrelevant.

This is especially true of laptops; when you're this close to the screen, touching it is hardly a chore. With a desktop machine, however, an accurate and integrated method of gesture control could be an excellent secondary controller. Right now though, Leap Motion isn't it. ■ Dave James

Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

An expensive, middling performance with a headline feature not worth the sticker price, but does have potential.





LAPTOP

\$449 | WWW.TOSHIBA.COM.AU

BENCHMARKS

	TOSHIBA CHROME- BOOK CB30	ACER CHROME- BOOK C720	HP CHROME- BOOK 11
FUTUREMARK PEACEKEEPER	2,854	2,897	1,175
GOOGLE OCTANE V2	10,844	11,144	5,756
BROWSERMARK 2.0	3,259	3,340	1,551
USB 3.0 4GB FILE COPY TEST (SEC)*	78	136	359
BATTERY RUN DOWN TEST (MINS)	461	441	335

*LOWER IS BETTER

Toshiba Chromebook CB30

The world's first 13-inch Chromebook.

Toshiba has a unique way to market the Chromebook CB30. This is the first 13-inch Chromebook. That doesn't mean it's the biggest, though – HP's 14-incher is. But when you're the latest to jump aboard the Chrome OS train, you gotta do what you can to stand out.

In looks, the Chromebook 13 certainly does stand out. It's stylistically reminiscent of wedge-shaped laptops such as the ASUS Zenbook or the MacBook Air, but that's only skin deep. While those pricier notebooks feature aluminum skins, the Chromebook 13 is painted plastic. Internally, however, the notebook isn't too different to others we've tested. It packs a dual-core 1.4GHz Celeron 2955U Haswell part without Hyper-Threading or Turbo Boost.

For context, we compared the Chromebook 13 to HP's Chromebook 11, which uses a Samsung Exynos ARM chip, and the Acer C720, which has the same Celeron part.

Generally, it tracked right with the Acer. It was perhaps a percentage point or three slower, but the two were mostly even. The Exynos was half the speed or worse, in general. Frankly, we'd avoid ARM-based Chromebooks, as they chug when you push them. One thing we'll note: The Acer C720 we used has 4GB of RAM vs the 2GB in the Chromebook 13. That gave it an advantage when we had 20 browser tabs open. It wasn't huge, but power browsers should shell out for the 4GB configs. The ARM-based HP, well, was simply atrocious.

The screen is a big part of the sales pitch. That 13-inch panel is pretty mediocre. Colours are muted, off-axis is meh, and worst of all, the screen shows considerable compression banding.

For ports, you get a decent amount, with two USB 3.0 ports, an SD card reader, and a mic-and-headphone combo port. For the security-minded, there's also a Kensington lock port, but as you know, if some lowlife swipes your Chromebook,

you lose nothing.

The island-style keyboard is average. The track pad is spacious, but we didn't appreciate its rough texture, and it had an annoying loose rattle to it. The speakers also rattled a bit when audio was cranked up to maximum.

There is some good news for the Chromebook 13, though: its USB 3.0 performance. It wrote a 4GB video file to local storage in 78 seconds. The Acer took 136 seconds, and the HP, which lacks USB 3.0, took an agonizing 359 seconds.

The final feather in the Chromebook 13's cap is its battery performance. We looped the FutureMark Peacekeeper test to run our units down. The HP Chromebook 11 is pretty fair at 335 minutes of run time. The Acer C720's gives you 441 minutes of use. And, the Toshiba lets you keep things running for 461 minutes. Since the test is CPU-intensive and keeps the Wi-Fi hot, you should expect probably another 20 to 30% of run time on more typical loads.

Overall, the Toshiba is a nice first attempt but it's got some issues. Although most won't notice, we think the banding problem needs to be addressed. At 1.5kg, it's also a little heavy. While that weight gets you a bigger screen, it doesn't buy you any actual window real estate, as the resolution is the same 1,366 x 768 as the 11.6-inch models. It's just a bigger font.

Finally, there's the price. At \$449 on the street, it's certainly not the cheapest Chromebook out there. This, combined with the other issues, still keeps the homely Acer C720 as our pick.

■ Gordon Mah Ung

Verdict

Features
Performance
Value



Good battery life, fast USB 3.0 performance, but a Mediocre screen, slightly pricey and mushy keyboard.





PROCESSOR

\$405 | WWW.INTEL.COM

Intel Core i7-4790K

Intel hits 4GHz out-of-the-box.

The king is dead. Long live the king. That always seems to be the way of things when Intel releases a new, high-end K-series processor.

You get a new ruling chip that's slightly younger and a bit more dynamic, but almost identical to the original in most other ways. The new Core i7 4790K could be a slightly different beast though – instead a 100MHz clock speed bump, we've got a hefty 500MHz boost.

The i7 4790K is the top chip in the new Devil's Canyon range, and completes this year's refresh of the existing Haswell processors. This Hyperthreaded quad-core, with its eight threads of processing grunt, is the most advanced CPU silicon around, and delivers out-of-the-box performance to rival a heftily overclocked i7-4770K. While the base clock of 4GHz is impressive, Intel is still sticking to its Turbo mode guns, so it's

actually capable of regularly hitting 4.4GHz.

So, how has Intel managed to achieve it? Well, much of the success is owed to the 4770K chip being capable of hitting 4.4GHz anyway, but to guarantee that the new 4790K chips would be happy running at such a high clock speed, Intel has also re-engineered the CPU package.

The most integral thing it has done is to replace the thermal interface material (TIM). Intel is calling the new goo a next-gen polymer TIM.

As well as the new TIM, Intel has also added some extra capacitors to the die package. On the pin-side of the 4790K you can see the extra power components where before there was just green PCB space. Those are there to smooth out power delivery to the silicon. Combined with the improved thermal material, that should offer an extra level of overclocking that previous Haswell CPUs couldn't do.

In terms of straight CPU performance the 4790K is around 10% quicker in the Cinebench rendering test and the x264 HD video encoding benchmark.

As mentioned, most 4770K chips are capable of hitting this sort of speed without much tweaking. What the 4790K offers is the ability to do it cooler. The improved TIM has made the new chip almost 10°C cooler under load. We tested both chips in the same board, with the same voltage and clockspeed, and the 4790K sat at a relatively chilly 62°C, while the 4770K hit 71°C.

Though it is adding a fair amount of extra power to ensure it gets to its top speed. At stock speeds the 4790K draws 30% more juice than the 4770K. That's a lot of extra power for a relatively small return.

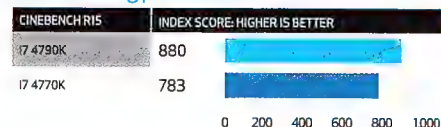
We were also disappointed by the overclocking performance of our engineering sample. We were

hoping the extra TIM and power components might offer a hefty amount of headroom, but our 4790K could manage 4.7GHz at best.

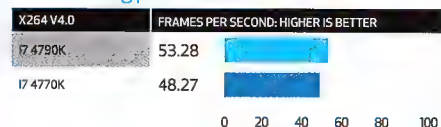
Still, because it's only slightly more costly than the 4770K you can't really be that disappointed. And because of its high stock and Turbo clock speeds you don't actually need to overclock it. So yes, the new i7 is the go-to processor for high-end PCs, but it's just a replacement part, not an upgrade for Haswell. If you've already got a 4770K we wouldn't make the switch. **■ Dave James**

LABS BENCHMARK RESULTS

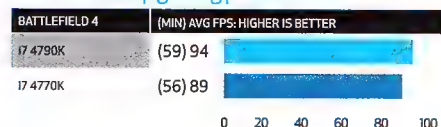
CPU rendering performance



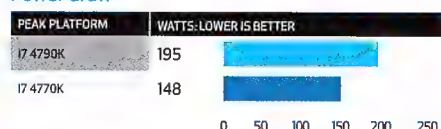
CPU encoding performance



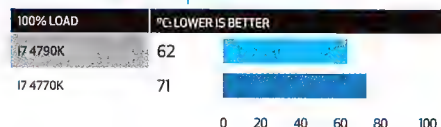
DirectX 11 1080p gaming performance



Power draw



Normalised thermal performance



Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

Another top K-series i7 from Intel, with high clocks and low temps, but no extra overclocking skills to show for it.



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2MIC stereo recording

DVT2500/DVT2700

CONVERSATIONS

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DVT4000

3MIC

3MIC AutoZoom+ recording

DVT6000

MUSIC

High fidelity remote recording

DVT6500

MEETINGS

360° meeting recording

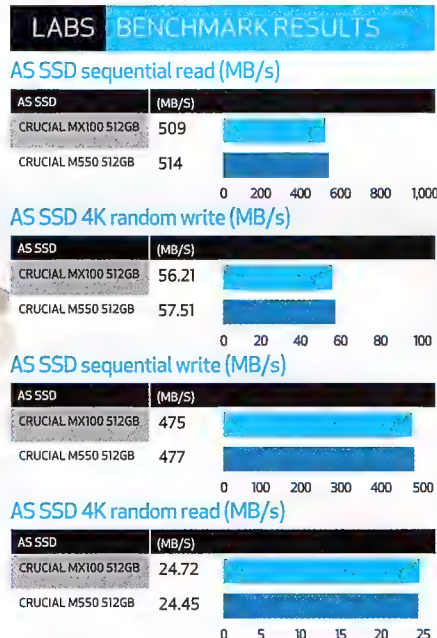
DVT8000



- A large colour LCD display for easy navigation and clear status information
- An integrated Li-polymer battery* for long battery runtime - up to 50 hrs
- Metal housing*, a robust design for extra durability
- New product colours, fitting different style and taste
- Improved audio recording for increased productivity & convenience

*Not including DVT2500/DVT2700

PHILIPS



Crucial MX100 512GB

Crucial releases yet another range of drives at bargain prices.

Do you remember a time when there was a pretty decent gap between launches of new SSD product lines? Crucial only released the M550 series some three months ago, and there is already a new range of drives to think about. To be fair to Crucial, the new MX100 line is more a replacement for the older M500 series than anything to do with the M550.

Whereas the M500 series topped out at 960GB, the MX100 flagship drive is a mere 512GB. In fact, there are just three drive capacities currently available for the MX100: 128, 256 and 512GB. This makes perfect sense because the real money is in the lower capacity mainstream market, with the sweet spot being around the 256GB mark.

Very high capacity SSDs are seen by most people as niche products, although the prices for these large drives are tumbling. Anyway, if you need more than 512GB,

there's the 1TB version of the M550.

As ever, Crucial has gone for an extremely competitive price structure for the new range. Capacity-wise, the drives don't match up exactly with the M500 series, and the MX100s are cheaper than the nearest M500 drive. The 128GB MX100 is \$98, the 256GB is \$149 and the flagship 512GB drive we're reviewing comes in at \$289.

The low pricing of the MX100s comes down to their use of Micron's brand new 16nm MLC NAND, details of which are being held firmly in-house at the time of writing. What is known is that they are 128GB dies and this density allows cost savings in manufacture. The 512GB drive uses 32 of these dies in 16 chips (two dies per NAND package), eight on each side of the PCB.

Controlling them is a Marvell 9189 controller that offers small improvements in performance and – perhaps of greater

importance – more efficient power saving than the 9187 in the M500.

Even though Crucial has used cheaper NAND in the drive to keep costs down, the MX100 still retains the power loss protection, the DEVSLP command, TGC Opel 2 and AES 256-bit encryption support as well as RAIN (Redundant Array of Independent NAND) support of the M550.

Crucial quotes sequential read/write speeds for the 512GB drive at 550MB/s and 500MB/s respectively, which is exactly the same as figures quoted for the 512GB M550. All three drives have the same quoted sequential read speeds, but the write speeds differ quite considerably – the entry level 128GB drive has to make do with just 150MB/s while the 256GB version has a quoted write speed of 330MB/s. In testing with the ATTO benchmark, the 512GB drive produced a read score of 531MB/s, which is a little bit shy of the official figures, and 511MB/s for

writes. The 4K read/write performance of the MX100 is pretty much the same as the M550, with a read score of 24MB/s and a write score of 57MB/s. In real-life testing, the drive took just 30 seconds (127MB/s) to copy a 4GB image and 2:19min to copy a 17GB Blu-ray image. These times are close enough to the M550 as to make no real difference in performance.

■ Simon Crisp

Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

It is to Crucial's credit that the MX100 drives are not only faster than their predecessors, but cheaper too.





PC CASE

\$150 | WWW.FRACTAL-DESIGN.COM

Fractal Node 804

A compact Swedish-made case that's a little boxy, but still good.

Fractal is a company that's no stranger to unusual case designs, though its latest is its oddest yet.

The Node 804 is a relatively squat and square micro-ATX box (which also supports mini-ITX boards) that's split vertically down the middle, effectively giving you two side-by-side compartments. In the left half (the one with the plastic window) sits your sideways-mounted motherboard and associated parts – graphics card, CPU cooler and the like. The right half contains your PSU and hard drives – with support for up to eight 3.5-inch units. What's perhaps most appealing about the whole thing is that the case itself is not particularly deep – it'll fit inside most entertainment cabinets. That makes the Node 804 pretty much perfect for building a media PC or server that's jam-packed with storage. (And if you must, you can chuck a slot-loading optical drive in the front of the box too.) It's a

breeze to work in, thanks to nice open compartments. We built a system using all eight drive positions and found the process reasonably effortless – our only real gripe is that it can be bit of a squeeze getting the SATA power cables of right-side drives squeezed in, as the top of the PSU can sit quite close to the backs of the drives. It's also not very good at dampening noise – the top is essentially one big open exhaust, covered only by a metal grill and some dust-filtering mesh. This clearly isn't a case for everyone – we dare say there are better (and smaller) options available. For a lounge-room PC packed with heaps of storage, however, we're yet to find better. ■ Dan Gardiner

Verdict

A uniquely-designed case that's perfect for a compact server box or storage-packed media PC.



GRAPHICS CARD

\$1,000 | WWW.ASUS.COM/AU

ASUS ROG Matrix-GTX780TI-P-3GD5

The Matrix is back on the throne.

High-end Nvidia graphics cards are like *Game of Thrones* – MSI and ASUS fighting to see who is king. MSI hasn't released a Lighting edition of the GeForce GTX 780 Ti, but ASUS hasn't let that lack of competition stop it from delivering a market-leading card.

The GTX780TI-P-3GD5 packs a massive two-slot cooler fitted with twin fans and is wrapped in the Republic of Gamers black and red colour scheme. That cooler offers quiet and effective cooling; we saw peak temperatures of 61°C under load, compared to a stock 780 Ti that reached over 75°C. Temperature control is critical on Nvidia cards: if the temperature is too high the card reduces its core frequency, resulting in lower and inconsistent frame rates.

ASUS has pushed the GPU frequency to a boost clock of 1,072MHz, a significant bump up from the 928MHz used on the stock 780 Ti. The

memory has been kept at 7,000MHz, though we found there is massive headroom for increased clocks. When we increased the voltage for overclocking we were surprised to reach 1,320MHz on the core without issue. Not content, we attached a custom water cooling loop, which allowed us to reach a frequency of 1,450MHz.

This card outperforms the stock 780 Ti by 15% in most gaming benchmarks tested. If you consider applying a modest overclock of 1,250MHz, you may expect to achieve performance boosts in the range of 25%.

From power delivery to cooling and looks, the build quality of this card is superb. This is undoubtedly a card worthy of sitting on the throne. ■ James Trevaskis

Verdict

Unchallenged as the top Nvidia card on the planet.





\$105 | WWW.SILVERSTONEK.COM

Silverstone Raven RVZ01

This DIY micro-tower takes flight.

The Raven is a micro-tower that somewhat resembles a console but has enough room inside for a high-powered PC. You can pack some powerhouse computing in here, but there are a few caveats.

The chief concern with micro-towers is how difficult it can be to install a video card. Not this time though. The bracket that holds the card is secured with a few Phillips screws. Remove those, lift the bracket out, connect your card to the bracket's integrated PCI Express connector, attach your PCIe cables, and put the bracket back in. Easy. There's even a slim 120mm fan preinstalled in that section of the case. Yes, this setup works best with a card that has a full "shroud," where hot exhaust comes directly out the back of the card, instead of getting circulated within the tower. But it's still an improvement over the usual mini-ITX setup.

The PSU also gets better-than-average treatment. You'll need an SFX instead of ATX, and these smaller units

are currently limited to 450W. We found that was enough for a GeForce GTX 780 Ti and an Intel Core i7-4770K, but the Silverstone ST45SF-G's gold rating has a lot to do with that. A more common bronze PSU might not cut it. The space for cabling was also very tight. And while the PSU has an intake grill on the other side of the case, it exhausts its heat internally. This isn't unusual for a micro-tower. We had to settle for the Silverstone's bundled slim fan. Add the absence of air intake in this section of the case, and we were unable to overclock the CPU without heat issues.

If you're not concerned about overclocking and just want something with a small footprint, the RVZ01 is really the only game in town right now. ■ Tom McNamara

Verdict

Easy access to internals, plenty of GPU, but lacks overclockability.



\$159 | WWW.LIAN-LI.COM

Lian Li PC-V360

Brushed-aluminum elegance—for a price.

Lian-Li's microATX case is narrower and more vertically challenged than most microATX cases, but you'd never guess that by the ample room inside.

Installing a typical microATX board didn't give us any issues, and we especially liked the chassis' motherboard standoffs. Securing up to four new PCIe devices was made a smidge more difficult through Lian Li's use of external screws for its add-in card brackets. However, this did give us a bit more horizontal space inside to work with.

Pushing in a standard-sized power supply is a tight fit, though. The PSU doesn't brush against the case's included top 12cm fan, but there's a very small amount of room for you to wedge your cables in. We barely had clearance for our 24-pin main power connector. The narrow chassis will also limit your air-cooler options.

The case's single 5.25-inch drive bay uses thumbscrews. The case's five 3.5-inch drive bays are split by a single plate that allows you to use

one as a 2.5-inch bay.

The internal cables for the case's two USB 3.0 ports and front-mounted 14cm fan are adequate in length. Even though this case is tight, you can wedge in a closed-loop cooler. The CLC bracket (or fans) is one of the most pleasing elements.

Not so pleasing: The fact that the case's two USB ports are fixed on its right side, toward the front-bottom of the chassis. Put this case under your desk and you'll be all but touching the floor just to mount a USB cable.

While you get the classic Lian Li brushed-aluminum elegance, there is a steep price for it. Aluminum will always cost more than steel, but that isn't our only problem. We think there are better options out there today. ■ David Murphy

Verdict

Lightweight; clever internal radiator mount; takes big GPUs.



**“Keyboard
of the
Year.”**



PC POWER PLAY, MARCH 2014, ISSUE#225

**CORSAIR
VENGEANCE**

K70

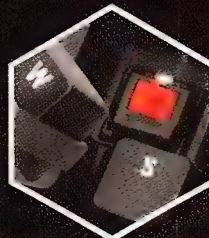
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When you're playing to win you need tools, not toys. Pro gamers around the world are making the K70 their weapon of choice because of its unprecedented combination of performance, comfort, durability, and style. If you've gotten yours, you know. And if you haven't, you've probably been beaten by someone who has.

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light tactile
feedback



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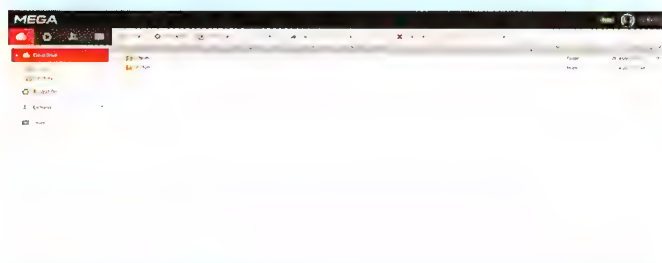
Become a gesture-fu black belt

FREE (TRIAL) / \$4.99 | APPSOLUTELY APPS | TINYURL.COM/QCG6JGJ



The true Windows master learnt long ago that keyboard shortcuts are crucial to improving efficiency. However, since the introduction of the touchscreen and the subsequent switch from interacting with physical objects to on-screen objects, we're commonly finding ourselves in situations where we can't actually use a physical keyboard.

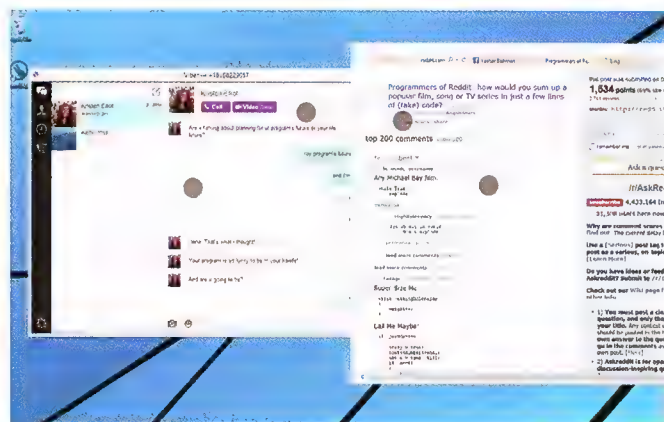
Thankfully, my buddy* Yashar Bahman at Appsolutely Apps has created TouchMe Gesture Studio — a free app that allows you to go beyond Windows' in-built gestures, and assign almost any gesture (well, any of 30) to almost any activity. So, you could: three-finger grab any window to move it around the screen; five-finger pinch out to move to the desktop; do a special double-tap-dance to switch between browser tabs, or a four-finger swipe up to open a new one; or really, anything you want — even adjust the volume or brightness. I recommend checking out the demo video at youtu.be/pCorg-ZJVJU for some inspiration.



MEGAsync

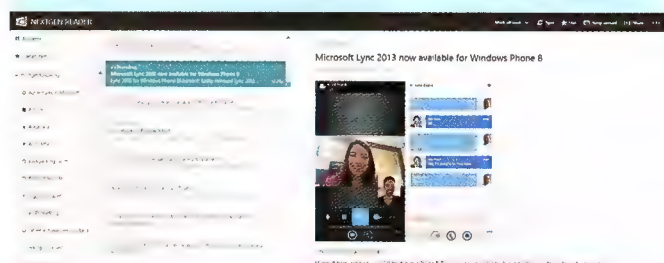
FREE | MEGA | MEGA.CO.NZ

Kim Dotcom took quite a hiding when the feds came for him and his MegaUpload site. Not being one to stay down when hit, he's re-launched MegaUpload as MEGA — and it's now more of a cloud-sync site like Dropbox. Unlike Dropbox, however, this site has privacy and security at its core, with end-to-end encryption of your files — i.e. the NSA (or MEGA) can't eavesdrop on what you're up/downloading, as you, and you alone, hold the encryption keys to your stuff. Best of all — and what begins to really set it apart from Dropbox — it offers 50GB for free accounts, and rather reasonable upgrades beyond that. Expect your favourite music blog to start posting MEGA links soon. MEGA's sync app is free, and allows you to keep any folder(s) on your computer in-sync with the cloud, your other Windows PCs, and your Android/iOS devices. Look to the site to offer secure communication (chat + calls) in the future, too.



While the app is free, all it does is create a gesture file to work with the TouchMe gesture engine — which isn't. Helpfully, the app comes with a 32 day trial of the engine, after which you can either have it work with only 3 gestures, or flick the dev US\$5 for the full engine.

*not my actual buddy.



Nextgen Reader

\$2.99 | NEXT MATTERS | TINYURL.COM/OOR5NET

While people have been claiming for years that RSS is no longer relevant, what with the real-time nature of Twitter and Google's sad axing of Reader, I have been known to tell these people that it's actually their face that is no longer relevant! ZING!... I was elated, then, when **Feedly.com** rose up and offered me a way to import all of my favourite feeds. Feedly is, therefore, still my chosen place to go when I'm looking for some interesting reading material. Browser-based apps, however, aren't always the best option, and Nextgen Reader surpasses the **Feedly.com** experience by offering an optimised touch interface (or a 'classic' one with keyboard shortcuts), tile support for your favourite feeds, and customisable colour schemes. In-line with Feedly's offerings, it also offers different reading views (summary, full article, or web page), and in-built support for Readability, Instapaper, and Google Mobiliser.



Mac » APPS

OmniFocus 2

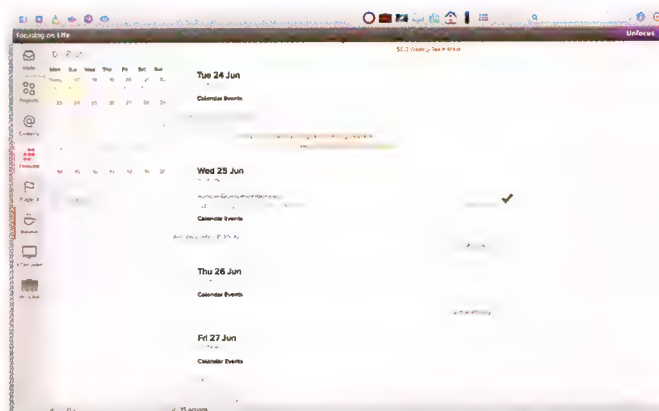
The time-management app gets a new lick of paint.

\$49.99 | THE OMNI GROUP | OMNIGROUP.COM

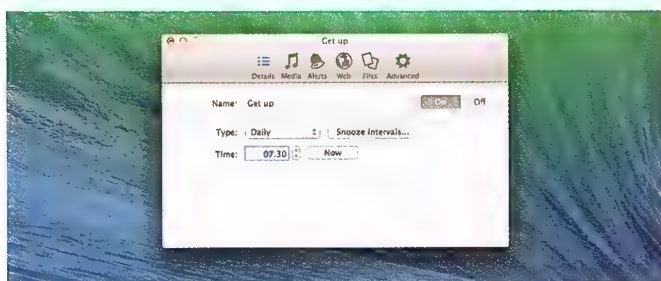


'Getting Things Done' (GTD) is a popular system of time management. It's based around a process of working out what the 'next action' is in any project coupled to a set of 'contexts' that let you know what actions you can do, depending on where you are and what's available to you. OmniFocus has been the most thorough implementation of GTD available on the Mac. It also had the steepest learning curve, with a functional interface, and a set of features that, while powerful, took a while to master.

The Omni Group is clearly aiming to change this. 2.0 features a reworked interface to get users into the software quickly, and make the core parts – projects, contexts, and the system of weekly reviews – more transparent. A revamped sidebar now contains tabs for projects, contexts, items you've flagged, and a dedicated review tab for checking over the state of individual projects. It also brings over a feature that



originated on the iOS version – the Forecast tab combines items that have been marked as 'due today' along with meetings from your calendar, into one view. Forecast works really well as a way of getting a top-line view of how busy you're likely to be that day. Forecast combines well with Focus mode. This allows you to focus on a project, context or folder full of either, blocking out all the others. There are a few new features that add to the app's capabilities. Quick Open, for example, lets you hit Command-O and start typing the name of any project, context or to-do item to go straight to it. OmniFocus comes in regular and pro editions.



Arise

\$19 | KALLAXA | KALLAXA.COM

Arise is an alerts system that lets you define alarms and timers that trigger actions. It can fire up iTunes (and wake a sleeping Mac), play web radio or alert sounds, take photos and screen grabs, set visual alerts, and send emails or post to a web page. There are also features for creating logs, executing commands and running shell scripts when the alert fires. However, such depth compromises Arise's elegance. You access existing and new timers through a menu bar extra, and there's a separate iOS-like window for housing alarms that would be better suited to being a standard app accessed using the Dock. The editing UI is simple but workmanlike, until you venture into web and scripting. Some options are a bit hidden away, such as weekday-only alarms; still, the alerts work well and there's plenty here if you're limited by your current alarm system.



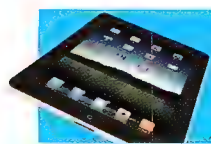
Beamer

\$15 | TUPIL | BEAMER-APP.COM

Beamer is a utility that aims to make sharing video from your Mac to an Apple TV easy. Of course, screen sharing from a Mac to an Apple TV is already an option in Mac OS X, but Beamer makes it easier and in full HD quality with support for 5.1 surround sound.

Fire up Beamer and it offers a small window onto which you simply drag video files. You can drop multiple files on the window to create a playlist, and if you're picky, we'd say that it'd be nice if Beamer also handled images and perhaps PDFs and so on.

Beamer is one of those small utilities that replicates what is already technically feasible on your Mac and yet makes the process that little bit easier. If you have folders full of video files and want to easily and quickly watch them on your big screen, Beamer is just about perfect. It's a top-notch tool and worth every cent.



App Store » iOS APPS

Adobe Voice

Time to tell your story – the iPad way.

FREE | ADOBE SYSTEMS | WWW.ADOBE.COM



Adobe Voice is a tablet-only app designed to help you convey stories without the need to shoot a single frame of video. The app takes the painstaking work out of pitching a new idea or communicating an inspiring concept to an audience – and best of all, it's absolutely free, with no IAPs either.

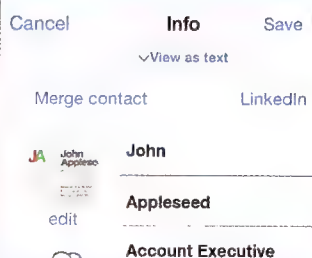
Packed with more than 100,000 royalty-free images, 25,000 icons, a variety of stock music or songs imported from an iTunes library, and template themes for any occasion. Using the iPad's built-in mic, you can convey your narrative message one line at a time while bringing text and still images to life with animation and transitions. At launch, Adobe Voice asks in plain English to briefly explain what your story is about. You can then choose from a variety of pre-designed structure templates such as "promote an idea," "share a growth moment," or start from a clean slate. Adobe has truly nailed the traditional heavy lifting required to create such content. Finding a graphic icon to help sell the story is just a quick search away, although some form of Internet access is required when downloading images to the iPad. Voice makes the actual creative process quite liberating for amateurs, but Adobe curiously limits the prospective audience by not



Describe the world today. What's the setting or context for your story?
Or show who you're helping.



allowing you to save your final creation to the actual device. Instead, projects are saved to Creative Cloud account, with the option to share via Facebook, Twitter, email, iMessage, or via a link. None of those options are particularly useful when an internet connection is unavailable, and uploaded files can only be accessed via the Voice app. On the plus side, Adobe includes full attribution for any stock content used in the end credits, and you can add your own text too. Adobe Voice makes it drop-dead simple to sell your story in minutes, although the output options are limiting.



Business Card Reader Pro

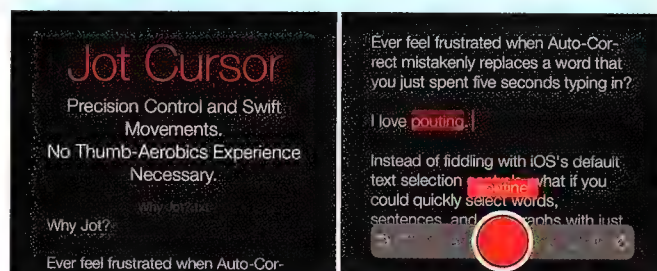
\$8.99 | SHAPE GMBH | WWW.SHAPE.AG

Business cards! Try as we might to live digitally, those rectangles keep coming. But now there's finally a way to tame the cardstock beast once and for all.

Although it's on the pricy side, Business Card Reader Pro turns any iPhone into a portable scanner with direct hooks to LinkedIn, Salesforce and Evernote, which recently beefed up its own business card feature.

While both apps do an admirable job with character recognition, BCRP can tackle 15 different languages (including Chinese, Japanese and Korean) and includes a built-in Card Holder, whether or not you add them to Contacts.

BCRP does display a kitschy 'scanning' animation, but effortlessly scans batches of cards in a single session — a godsend for anyone with more than a few new contacts to enter.



Jot — Refined Text editor

\$4.99 | BOSCO HO | WWW.JOT-APP.COM

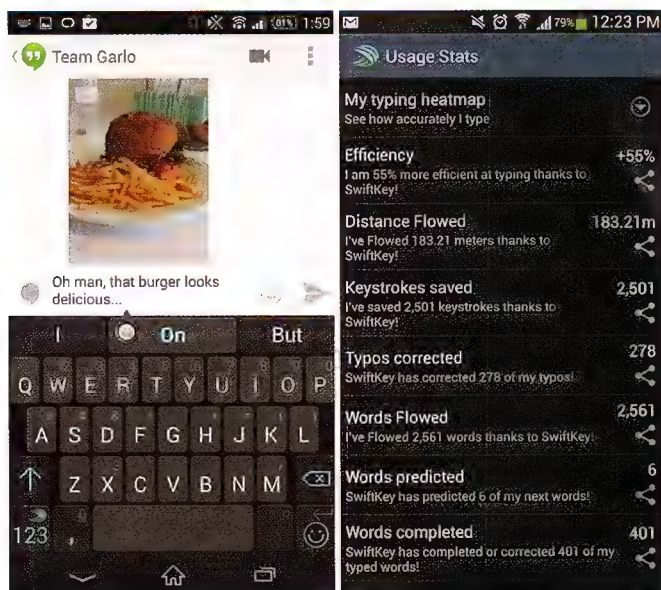
Jot goes retro in its approach to fixing text selection on iOS, adding a red selection tool that's reminiscent of the little mouse pointer nub from ThinkPad laptops. It sits above the normal iPhone keyboard, and when you want to move the cursor a little, you can just swipe on it, like an on-screen joystick.

This can help to speed up fixing little mistakes, but Jot also adds extra punctuation and Undo/Redo options, and adds the ability to easily revert words that autocorrect mangles.

You can also use the dot to quickly select words, sentences or paragraphs for copying and so on. It works pretty well, especially if you just make a small mistake a couple of letters back or want to go up a line or two. For scrolling through entire lines, it's less precise. With Dropbox storage and sharing options, it's easy enough to fit into a workflow.



Google Play » ANDROID



SwiftKey Keyboard

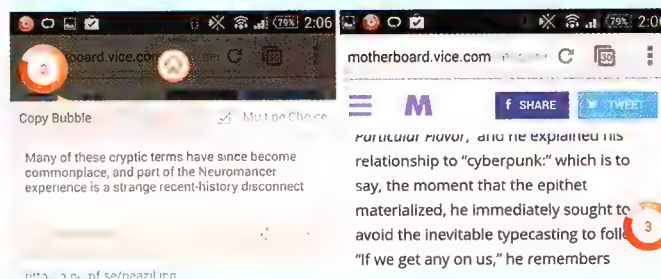
Arguably the best keyboard for Android, now totally free.

FREE | TOUCHTYPE LTD | SWIFTKEY.COM



One thing Android has amply proved is that you can create a better software keyboard — compared to iOS's ageing tapper, handsets running Google's OS offer almost science fictional typing tech by comparison. However, if you're using the default keyboard that came with your phone you might be missing out on even more typing greatness.

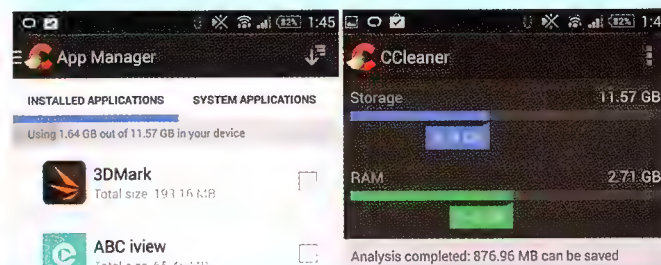
SwiftKey is an Android keyboard that we've covered a few times before in APC, and now that it's gone free you've got no excuse for not trying it. Its original claim to fame was that it learns what you type and can automatically suggest the next word in a sentence based on what's preceded it (this is something that Apple is actually building into its iOS 8 keyboard), but it also supports trace typing (ah-la Swype) and is, in general, exceptionally fluid and responsive to use. It can also sync your personal dictionary to the cloud so you can get your words across all your Android devices. Oh, and for the young uns, there's lots of 'cool' emoji which they can use to express themselves without having to resort to using something so crude as letters and words. SwiftKey was previously US\$3.99, but its switched to a freemium model, selling optional keyboard themes (more colours, basically) from US\$0.99 a pop. You don't strictly need them, though, so this one's definitely worth a try if you're seeking a better mobile typing experience.



Copy Bubble

FREE | DIIGO, INC. | COPYBUBBLE.COM

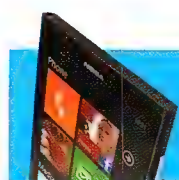
Despite all the changes and improvements that smartphones have enjoyed over the last 7 or so years, one thing our mobiles still struggle with is multitasking. If you're the type that's constantly juggling multiple bits of information on your mobile, you'll know how frustrating it can be to manage this kind of task on a compact touch-based interface. Copy Bubble can slightly ease the pain of mobile multitasking by keeping a running list of all the text and images you've recently copied; it's a clipboard manager for your smartphone or tablet. You can access the list of items by tapping the circular 'bubble', which you can drag around your screen and position anywhere you like. If you need to actually work on your phone, we've found this one a godsend for putting together more complex documents or emails while on the go.



CCleaner

FREE | PIRIFORM | WWW.PIRIFORM.COM

Like our PCs, smartphones and tablets have a tendency to slow down over time as we install and uninstall apps and fill them up with the detritus of our digital lives. The best way to speed up a degraded Android device is generally to do a factory reset and start again, but if you'd rather avoid that then CCleaner is worth a look. It's well-regarded for its ability to clean out a lot of the build up that can slow down a PC. This Android edition doesn't go quite as deep as the Windows version, but it can clear the caches used by apps — which on our test handset were eating up close to 1GB — alongside history cleaning capabilities for your browser, phone calls, SMSs and Google Play searches, among others. You can also see what processes are consuming system memory on your device, which can be a good way to find out if system lag is being caused by a specific app. Lastly, there's a batch app uninstaller, which lets you check off any unwanted apps and uninstall them in one hit. A great one for your Android toolkit.



Windows Store » WIN PHONE 8

Vivino Wine Scanner

Take the mystery out of wine by simply taking a photo

FREE | VIVINO | TINYURL.COM/PRHZUCH

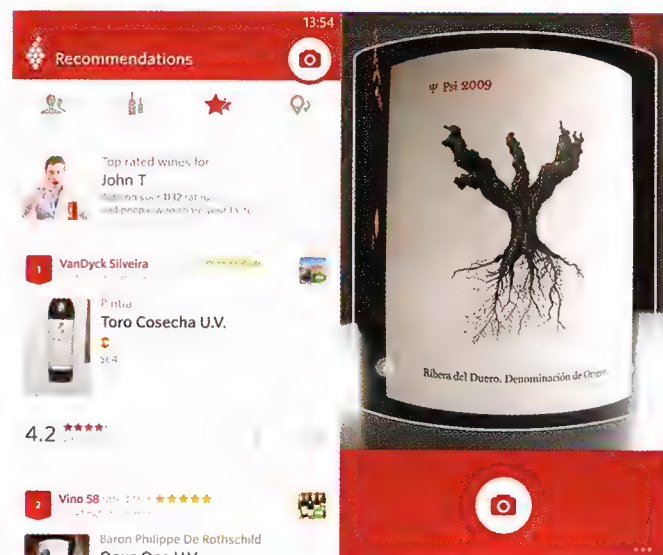


Wine is an imbibe that is as complex as it is delicious. I have said on some occasions, perhaps with some snobbery, that "If you don't like wine, you just haven't tried the right one."

Of course, the myriad grape varieties, growing regions, ages etc., often make finding that "right" wine a difficult task. Indeed, you may have been frightened off by a bold Shiraz, when your palette may be happier with a fruity Merlot.

So how, then, does one go about finding that perfect match for your tongue? And, more practically, that perfect match for the dinner party you're heading to?

Vivino is a worldwide wine database that set out to be the IMDB for wine, but has since turned into so much more, as its app allows



you to take a photo of any bottle of wine and instantly see recommendations, reviews, meals it would match to and more. It even contains information on the many grape varieties and growing regions, so you can start to get an idea of what may best suit you.

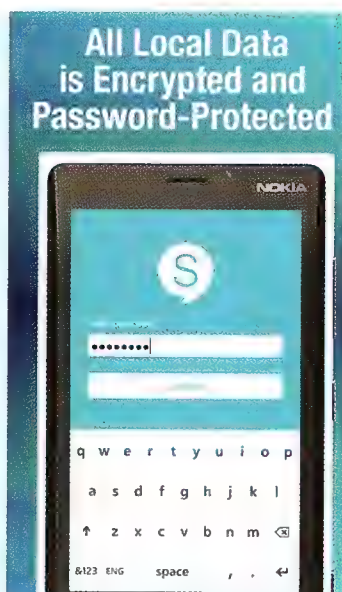
Even better, if you start rating the wines that you have (or haven't) enjoyed, it will even begin to recommend other ones that likely suit your tastes. Suddenly, the drink of the gods is in reach of us mortals.

Sicher

FREE | SHAPE | TINYURL.COM/QA8JGPA

If Mr Snowden taught us anything that the X Files didn't, it's that you are being watched. Sicher (made by some of the folks behind IM+) is a point-to-point encrypted messaging app that is based in Germany (away from the NSA's eyes) and aims to keep your conversations purely between you and your contact(s). The data isn't stored anywhere but your phone, and self-destructs after a set period of time. The app is only accessible by entering a

passcode, and the contents of your messages are hidden from notifications so people picking up your phone can't get to it either. It even supports encrypted file transfers, so those super-secret laser-beam blueprints can secretly and safely make their way out of communist Russia. Marvellously, it's free (and without ads), and also works on iOS and Android, so get your friends to install this, too, and keep Uncle Sam/Ol' Zuck out of everyone's daily comings-and-goings.



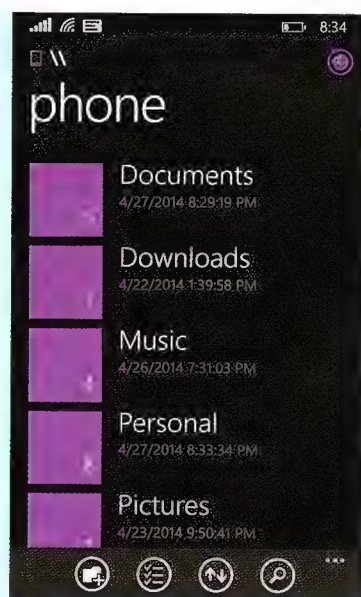
Files

FREE | MICROSOFT | TINYURL.COM/NF7PX57

Microsoft has (finally) released an official file manager for Windows Phone, with the no-fuss title of Files.

The title is perhaps suitable however, as this really is a no-fuss file manager. You can browse and search for files on your phone or microSD card, then delete, move, copy, open, or share them. As expected, you can also create or delete folders, and see how much storage space is left on your phone/microSD card. The sharing feature is probably the most interesting part, though, as it allows you to select single or multiple files to send to friends via the OS' in-built sharing options.

Unfortunately, the app is only available for Windows Phone 8.1, and it won't be making its way to earlier versions thanks to its use of some of the new 8.1 APIs. WP8 users may want to try the free Aerize Explorer instead.





BEST CHOICE IN PERFORMANCE

RAIDER

450W / 550W / 650W / 750W

- **FSP MIA IC™ Technology**
FSP's own patented design to provide performance/protection
- **+12V Single Rail Design**
Designed for power-intensive VGA cards
Provide strong power to any overloading conditions
- **SATA Array Cable**
50mm intervals for SATA device installation
Optimize the airflow inside the case
No-hassle with case side panel



HARDWARE
secret

+12V
SINGLE

+12V
Single Rail



SATA
Array Cable



MIA IC™
Technology



Haswell
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WWW.FSPLIFESTYLE.COM



The smart choice in SSDs

Samsung's EVO family of solid-state drives offer the most compelling mix of performance, price and capacity on the market.

➔ SSDs have transitioned from niche products made for enthusiasts and professionals to something that every PC should have. As SSDs have aptly proved, traditional platter-based hard drives can be a huge bottleneck when it comes to performance, with today's SSDs offering up to five times the speed when it comes to reading and writing data — and many times that in more seek-intensive tasks, like the random reads and writes that make up most of our day-to-day computing tasks. In short, if you want a computer that not only boots up and loads apps quickly, but is also incredibly responsive, then an SSD upgrade is a must.

So which SSDs are the best-value proposition in today's market? There's a lot of competition from SSD makers (both big and small), but of all those, Samsung's EVO line of drives has the most persuasive range of products. If you need a big SSD, Samsung's EVO range features the largest consumer drives available, with models ranging up to a whopping 1TB.

Feeling the need for speed? The EVOs consistently perform on-par with — and often better than — more-expensive drives from other

SSD manufacturers. And that potent mix of capacity and speed isn't going to cost you an arm and a leg either — the EVOs are some of the best-value SSDs available and they can be scooped up for less than \$1 a gig.

EVO drives also include exclusive technologies, such as Samsung's Magician software, which can make it easy to transition your PC or laptop from your old drive to your new EVO SSD. Magician also includes the innovative RAPID Mode, which detects frequently-used data and caches it to DRAM. This not only helps improve performance, but can reduce wear and tear on the SSD itself.

Samsung is an undisputed expert when it comes to flash storage. Its chips don't just end up in its own devices (including its popular Galaxy smartphones), but even in products from its major competitors. It's this level of integration that helps Samsung put together the most compelling SSDs currently available. Whether you're looking for an inexpensive way to upgrade your laptop's hard drive to turn it into a lightning-fast portable PC, or putting together the plans to build your next killer gaming rig, Samsung's EVO line up is the smart choice when it comes to SSDs.



The 840 EVO at a glance

Capacity
Up to 1TB (1TB = 1 trillion bytes)

Form Factor
2.5-inch

Interface
SATA 6Gb/s (Compatible with SATA 3Gb/s & SATA 1.5Gb/s)

Dimension (WxHxD)
100 x 69.85 x 6.80mm

Weight
Max 53g

Storage Memory
Samsung 19 nm Toggle DDR 2.0 NAND Flash Memory

Controller
Samsung 3-core MEX Controller

Cache Memory
Samsung 1GB Low Power DDR2 SDRAM

Application
Desktop PC & Laptop PC

SAMSUNG

Samsung Super-speed Drive

Samsung SSD 840 PRO



Samsung SSD 840 PRO with RAPID mode technology

Samsung's fastest and most powerful SSD range yet with RAPID mode technology. A distinguished level of Samsung performance available to anyone. Visit www.samsung.com/ssd for more information



CREATE

THE ULTIMATE HOME MEDIA JUKEBOX

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BUILD THE PERFECT HUB FOR YOUR TV SHOWS, MOVIES AND HOME VIDEOS – AND STREAM THEM ALL TO ANY DEVICE!

Times have changed. Building a dedicated media PC used to mean you needed to be saddled with a big, blowy box plonked down next to your TV. This month, we've demonstrated that you can construct a thin, hi-fi component-like media PC (see page 44), but there are many other viable options for media PCs out there. The Gigabyte GB-BXi5G-760 that we've reviewed on page 23 is a tiny unit that packs gaming capabilities into a package small enough to be mounted on the back of your TV. (In fact, it even includes a bracket specifically for that exact purpose!)

Not everyone really needs this diminutive (and \$900) gaming machine, however, so if you're looking for a more-affordable alternative we'd suggest considering something like Intel's Celeron 2820-equipped NUC (which has the completely unmemorable model name of DN2820FYKH). This \$180 box only needs to have a \$50 stick of RAM and \$50 hard drive (or SSD) thrown into it to make it a formidable media playback machine that'll whip the hell out of any prebuilt network media player. Combine it with a NAS box and a remote (or Xbox controller) and you've got an all-in-one entertainment box that can also handle your downloads (via the likes of *Sick Beard* – see page 68) for under \$300. The one caveat with this low-cost Celeron model is that it's not quite ready for the incoming 4K video revolution (though we must admit, 'slowly emerging' might be a better description of the latter) – for that, you'll need to jump up to a Core i3 or Core i5 machine, which'll cost you another \$150 or so.

But coming back to 4K, at the moment, it's worth pointing out that the only place you'll actually see it is on your PC – via web streaming services like YouTube, Vimeo and Netflix (which in the US is offering *House of Cards* and *Breaking Bad* to subscribers) and, in stores, via dedicated demo reels put together to promote new UHD TVs. With our airwaves already overstretched trying to handle the 720p and 1080i streams of current terrestrial TV, the argument for a good media PC to handle 4K remains a strong one.

It's not the best one though. We love the media PC at APC for a few simple reasons – and being powerful enough for 4K isn't even that high on the list. No, we love the media PC because it's the most flexible and expandable way to create and manage your media collection and then stream it to your other devices. With a PC at the heart of your media library, you really can roll it your own way – no matter what particular 'way' that turns out to be.



Build a compact media PC

Chris Zele builds a Thin Mini-ITX machine, which is not only small but fast, stackable, and packed with tons of storage.

Today's HTPCs tend to be either diminutive NUC-style bricks, or big desktop cases bristling with hard drives and GPUs.

For this build, we decided to see if we could create something that offers decent performance and storage options while never screaming to the world that you have an HTPC tucked in your AV rack.

In other words, we wanted to build a PC that at first glance would look like a Blu-ray or DVD player. For that, we turned to Silverstone's austere PT12B and reached for the motherboard form factor no one ever thinks of: Thin Mini-ITX. Thin Mini-ITX is an extension of the Mini-ITX pushed by Intel. This board is primarily intended for use with DIY all-in-one PCs, and its claim to fame is being, well, thinner.

No mobile CPU would be enough for our thin HTPC, so we reached for a desktop Haswell. Since the machine would be thin and stackable, we opted to include a slot-fed optical drive to class it up, too.

CRAMMING IN THE HARDWARE

We stuffed all of our hardware into a Silverstone PT12B Thin-ITX chassis. Oddly, this case doesn't have cutouts for mounting wireless antennas, so we used a Netgear N600 USB adapter for our PC's wireless duties. It's not optimal, as we burn an external USB port, but the alternative would have been to put patch antennas inside an

all-metal chassis, which we found even less ideal.

We outfitted our case with a Gigabyte H87-TN motherboard, which comes with one mSATA port, four SATA 6Gb/s ports, a x4 PCI Express slot, and two SO-DIMM slots. Next, we threw in a Core i3-4330. This dual-core Haswell part has Hyper-Threading, buzzes along at 3.5GHz, and has a TDP of 54 watts. Cooling this power-sipper is Silverstone's low-profile AR04 cooler, which fits perfectly into the 1.4-inch tall case and can be found on eBay.

Now for the important stuff: the storage. We knew we wanted a fat drive for local storage duties, but we didn't want to compromise on responsiveness,

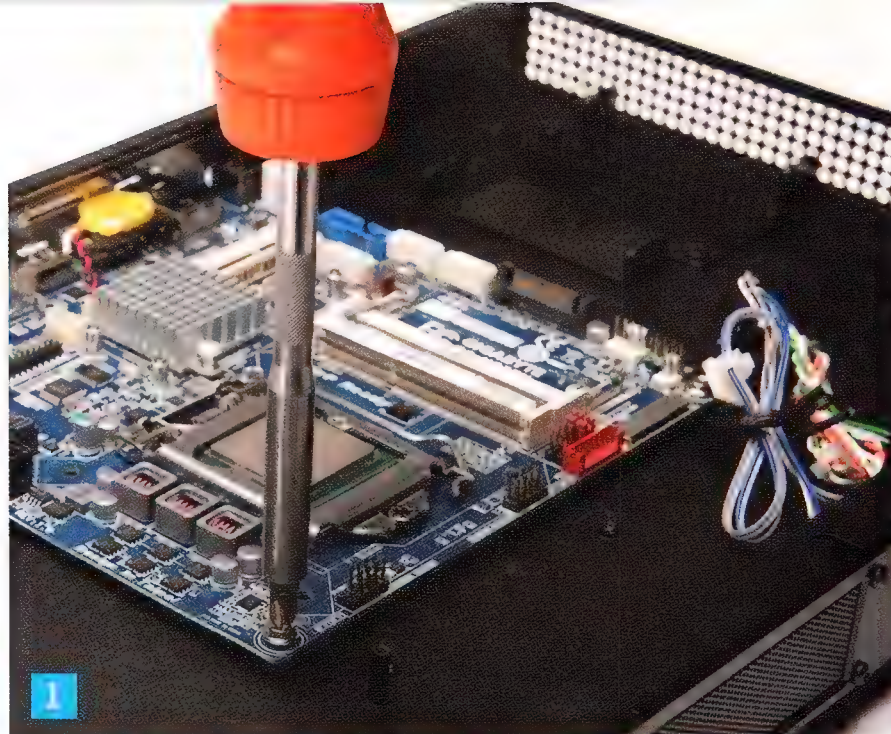
so we put in a Crucial M500 128GB mSATA SSD for \$75, which gives us a fast boot disk with ample storage for our applications and OS. We then put in a mechanical hard drive for storing all of our movie media. We chose a 2TB Seagate/Samsung Spinpoint M9T drive, which claims the crown of thinnest 2TB drive available.

To power all this equipment, we used a 150W AC adapter. These adapters are sometimes used in gaming notebooks, and they're compatible with Thin-ITX mobos. Our rig only pulls about 80W, so this is more than enough power. Last but not least, we also tossed in a slimline slot-fed optical drive, so we could play our ancient DVDs on it.

Case	Silverstone PT12B	\$100
PSU	Dell 150-watt power brick	\$47
Mobo	Gigabyte H87-TN	\$133
CPU	Intel Core i3-4330	\$140
Cooler	Silverstone AR04	\$35
GPU	Intel HD 4600	N/A
RAM	2 x 4GB Corsair Value Select 1600MHz	\$73
Wireless Adapter	Netgear N600 USB Adapter	\$45
SSD	Crucial M500 120GB mSATA	\$75
HDD	2.5 inch Seagate 2TB	\$129
Optical drive	Panasonic UJ8C5	\$53
Cable Kit	2 x Silverstone Tek Ultra Thin SATA Cables	\$20
Case Fan	None	\$0
OS	Windows 8.1 64-bit OEM	
Total		\$850

1 MOUNT THE MOTHERBOARD AND INSTALL THE CPU

Laying down this Thin-ITX board is similar to installing any other motherboard, but it only takes four screws to hold it in place. Once it's secure inside the chassis, put in your processor, making sure the pins line up correctly with the socket. At the top of the processor there will be two notches cut out of the CPU's die to help you line up the CPU with the socket. Place the processor down and clamp it in place with the latch. For our processing needs, we went with the Core i3-4330, primarily because its TDP is 54 watts and our cooler only supports CPUs up to 60 watts. The 4330 gives us access to Intel's efficient cores, which are top dog today.

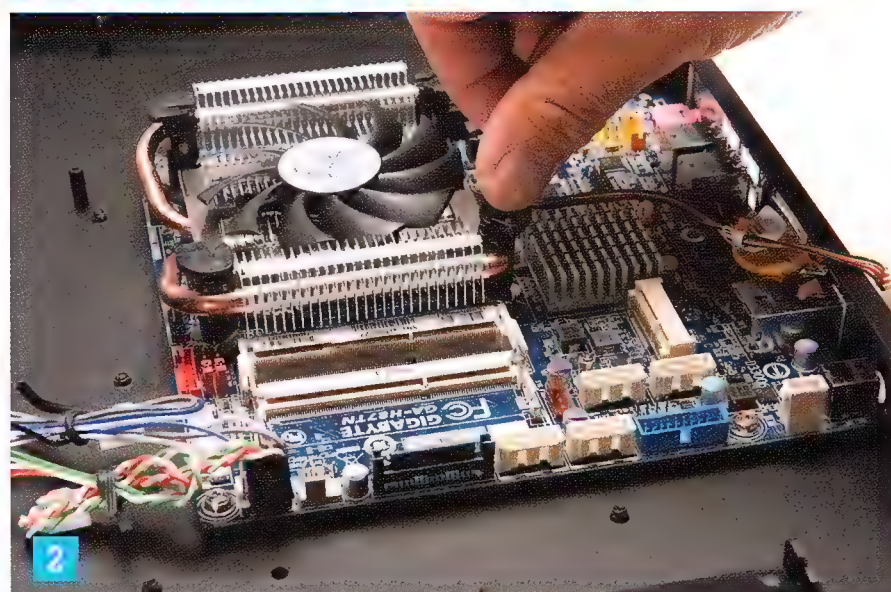


2 INSTALL THE COOLER

Installing our cooler was similar to installing an Intel stock unit, but it features a much smaller Z-height than Intel's reference cooler designs. The AR04 has integrated heat pipes and can cool CPUs with up to 60-watt TDP – but it can be a tad loud.

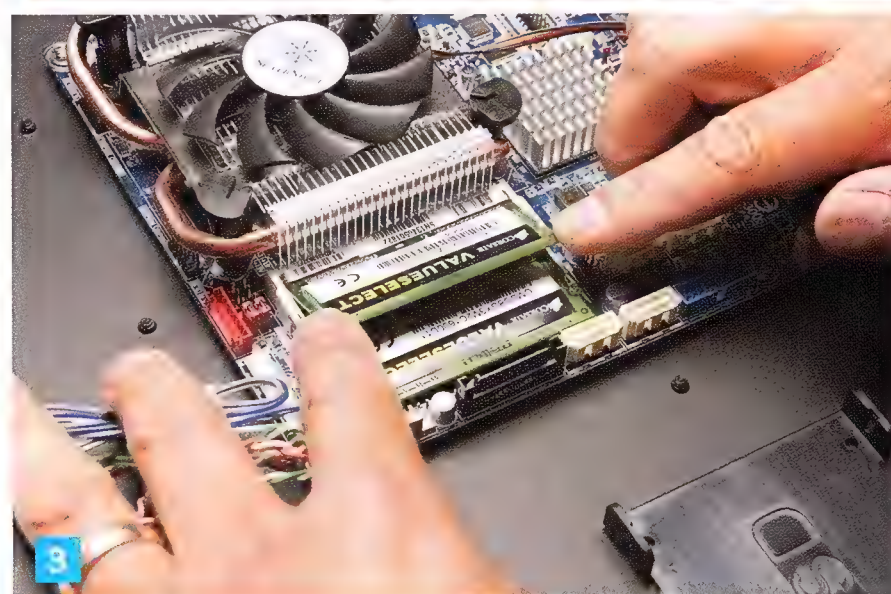
To install the heatsink, first put a dollop of thermal paste (about the size of a kernel of corn) onto the processor, then spread the paste around so the heatspreader is evenly covered. Once the paste is applied, attach the AR04 and push the heatsink's push pins down until they lock into place with an audible click. After the heatsink is secured to the motherboard, plug the unit's 4-pin power connector into the CPU fan header. To ensure that the cooler is properly attached, check to see that all push pins are firmly attached to the motherboard. If you're unsure, you can remove the motherboard and check its underside to see if the pins are properly fastened into place.

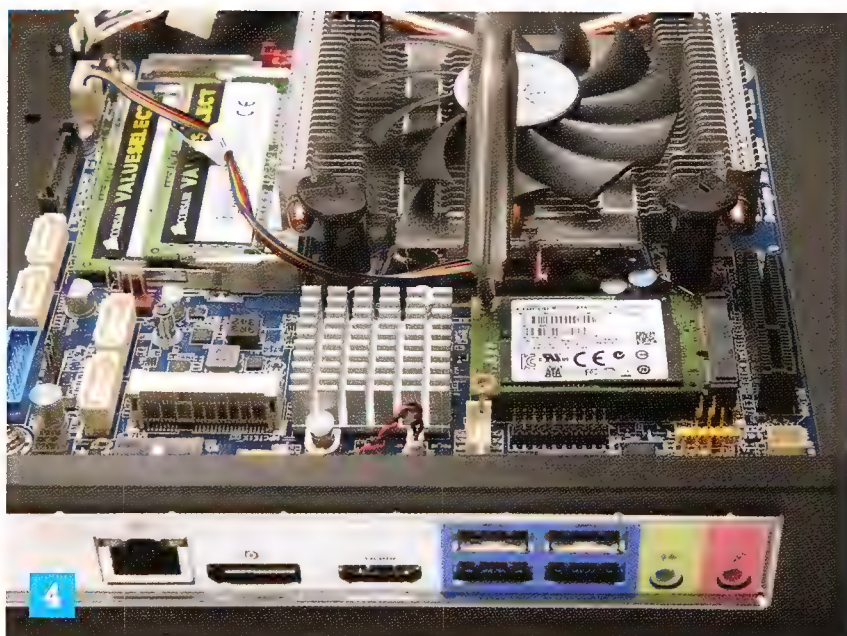
"Since the machine would be thin and stackable, we opted to include a slot-fed optical drive to class it up, too."



3 DROP IN THE RAM

Our motherboard includes two SO-DIMM slots, so we snagged 8GB of DDR3/1600 Corsair Value Select RAM and tossed it in. We chose 1,600MHz modules because Thin-ITX boards are sometimes finicky with higher-clocked modules. DDR3/1866 and DDR3/2133 SO-DIMMs also come with voltage that's too high for non-enthusiast boards. If you're asking, "Why only 8GB?" it's because no application we'll be using should even come close to using that much RAM. Yes, 4GB of RAM would have sufficed in a pinch, but it was only \$35 more to move up to 8GB, so why not? Installation of the memory is similar to that of a laptop; it requires you to push the DIMMs in at angle, then slowly apply pressure until you hear them click into place.





4 INSTALL THE MSATA DRIVE

The 120GB CRUCIAL M500 mSATA drive we chose for this rig was \$75, meaning we paid roughly 62 cents for each Solid State gigabyte – a bargain-hunter's dream! In the past, mSATA drives were very expensive at around \$2 per gigabyte. We're glad to see this has changed and more affordable solid-state storage is finally coming into the marketplace. Installing an mSATA may seem scary, but it's just like installing a SO-DIMM with an added catch: You'll need to screw it into place. Put the mSATA SSD into the mSATA slot at a low angle and press down on it slowly until it touches the screw mount on the motherboard, then screw it into place. Depending on your motherboard, you'll use either one or two screws to attach it.

5 INSTALL THE ODD

Putting in the ODD was quick and easy. We unscrewed the case's ODD cage and dropped our DVD drive into it. You'll need a small Phillips screwdriver for the miniature screws that hold the optical drive in place. Silverstone's PT12B case, fortunately, comes with three of these screws, so if you have a spare slimline ODD with missing screws, this case has you covered. If you're prone to losing screws, as we are, you can use a piece of tape to hold these puny screws in place while you work on your rig, and keep them from rolling away into oblivion.

When we last reviewed Cyberlink's PowerDVD 13 Ultra media software, we praised its ability to up-convert DVDs to look better than some Blu-ray movies. The software's sharpening tool makes each image crisper and more vibrant. Unfortunately, VLC media player's sharpening tool doesn't come close to that of PowerDVD 13, which means you'll have to fork over \$100 to Cyberlink to get the best HD up-conversion experience. If you pony up for a Blu-ray drive, PowerDVD will sharpen those movies, too.

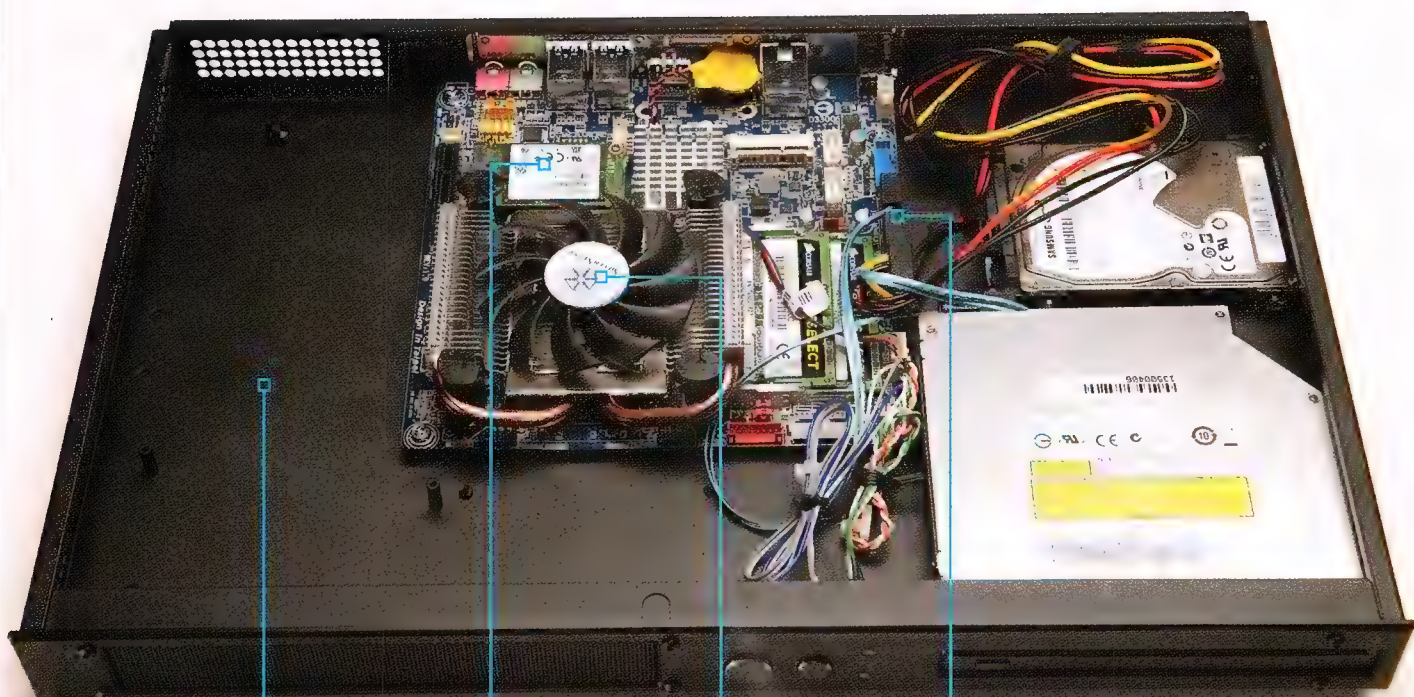


6 BRING ON THE STORAGE

For our 2.5-inch drive bay, we chose to go with a 2TB Seagate/Samsung Spinpoint M9T HDD. The Crucial M500 mSATA SSD in this rig provides us with zippy boot times (less than 10 seconds), but this mechanical hard drive gives us tons of room for storing our media. This is a media player PC, so we didn't want to skimp on the storage. To install the 2.5-inch drive, first, unscrew the hard-drive cage from the inside of the case and remove it. Next, secure the drive to the cage using normal-sized HDD screws. To finish up the installation, secure the cage back into the case, then connect the drive to a SATA cable and SATA power cable.

This chassis has another cage on its underside, allowing you to attach the PT12B to a TV or PC monitor. You'll want to have a substantial panel to attach this case to, as the full build weighs in at around 6.8kg. We would not recommend trying to attach it to a 22-inch panel; you'll likely destroy it in the process.





EXPANSION

We wish the PT12B used this space for 2.5-inch drives instead of the optional Intel heat-pipe kit.

SSD

Our small mSATA SSD from Crucial is fast and takes up almost no space, with no need for SATA power connectors.

COOLING

When installed, the AR04 cooler stands just one inch thick, making it a great fit for most tiny cases.

MOTHERBOARD

Thin-ITX motherboards run off external power supplies, so cable management is much easier—no 8- or 20-pin motherboard power connectors.

MORE THAN JUST A MEDIA PLAYER

To see how well our thin HTPC performed, we threw it a slew of typical HTPC tasks: We downloaded a Steam game, watched DVDs upscaled to 1080p, and browsed the web. All this ran without the performance slowdowns that we remember so well from the cold, hard days of Atom-based HTPCs. We even did some very light-duty gaming, and it was surprisingly workable. We should note that “light-duty” is the operative term here. If you’re expecting real gaming in the living room, you’ll need a real GPU and probably at least a micro-tower form factor.

For comparison, we stacked our thin HTPC machine against the spate of NUC/Brix machines we’ve seen recently. We were surprised that the Core i3-4330 didn’t perform as poorly as we expected against the Core i5-based NUCs, but to be fair, most of the NUC-style boxes we’ve tested pack dual-core mobile CPUs, not desktop quad-core parts. In our benchmarks,

the thin HTPC basically body-slammed all of the NUCs we’ve ever tested, except one.

That one exception is the kick-arse Gigabyte Brix Pro with its Core i7-4700R quad-core chip. The Brix Pro puts the little Core i3 in its place in every test except the Google Octane 2.0 benchmark, which doesn’t exactly push all the metal in the Core i7-4700R, anyway.

We should mention there was a weird anomaly we encountered with our thin HTPC machine: the CPU had issues throttling down. Apparently, Gigabyte hasn’t updated its UEFI to support the newer Core i3-4330 CPU yet.

The CPU never throttling down from 3.5GHz was both good and bad for our build. The good: We got every bit of performance possible out of the Core i3-4330’s 3.5GHz cores. The bad: Our cooler fan ran at a near constant 3,500rpm, making it louder than we had hoped. We hadn’t exactly wanted a blaring fan while trying to relax watching movies.

Despite the AR04’s fan buzzing away at ridiculously high RPMs, our Silverstone PT12B was still a very relatively cool-running case. When we put our hand on the unit, we couldn’t find a warm spot anywhere on its chassis. The case stayed cool even when we were gaming. Most compact designs tend to get mighty warm under heavy loads.

Using our hindsight meter, we decided that if we had to do it again, we’d probably go with an even slower and cheaper LGA1150 chip, such as a Celeron G1820 (just \$50). We could also have dropped it down to 4GB of RAM, stripped out the 2TB hard drive, and the ODD, too. At that point, though, we probably could have just bought a cheap Celeron NUC, so maybe we should be happy with what we built. ■



Perfect playback, big screen or small

APC reveals how to set up the ultimate media jukebox
with XBMC and Plex.

Xbox Media Center has been around for over a decade and despite the name, XBMC has long since left its Xbox past behind. It's an open-source program and for media fanatics, it's effectively become the go-to app if you want to play back your digital videos in your lounge room. It's one of the most

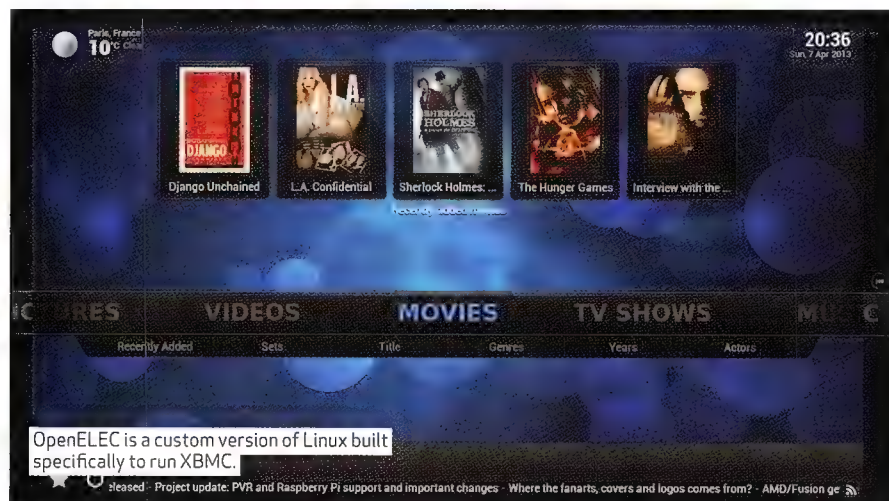
powerful media players around – and also expandable and customisable thanks to a huge range of third-party add-ons and skins – but despite all that it's also user friendly.

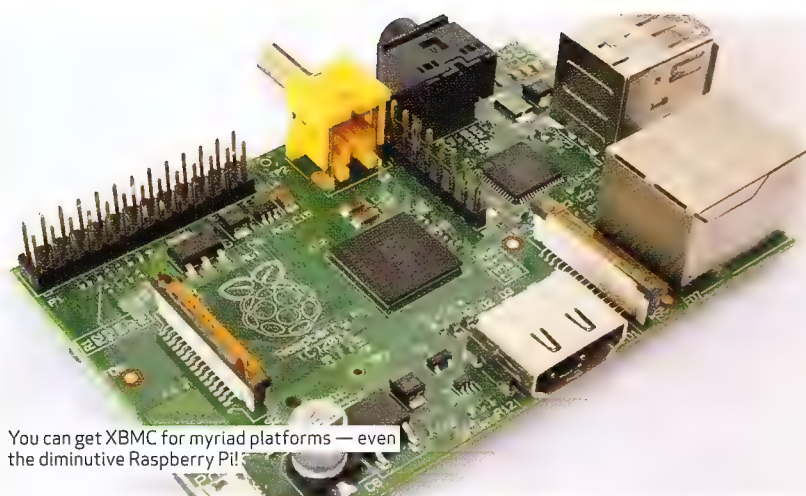
There's a multitude of ways you can get XBMC – you can find versions for Windows, Mac and Linux, but it can be installed on Android devices, the Apple

TV or even the Raspberry Pi. There are also several dedicated Linux distributions that effectively turn the open source OS into a dedicated install of XBMC. These offer some of the most problem-free (and speedy) methods of running XBMC – check out OpenELEC (openelec.tv) or XBMCbuntu (xbmc.org/download) if that idea appeals. We've used a standard Windows install for this guide, but the instructions won't differ much (apart from some of the more advanced tweaks of XML files) if you're using another version.

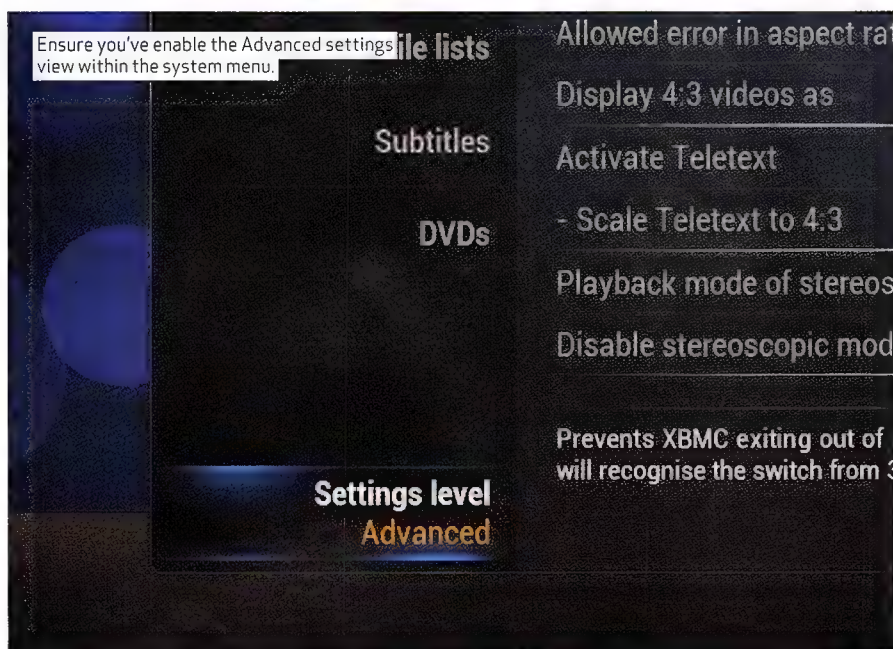
GET STARTED

If all you're after is the basics, you can download and install XBMC and, after using the setup wizard to point it at your movie and TV collections, you'll get a very robust media jukebox from the get go. However, for the ultimate setup you'll need to be prepared to roll up your sleeves and do some tinkering – there's a lot more functionality to be had if you spend an hour or two fine-tuning settings, installing add-ons and optionally grabbing a couple of third-party apps.





You can get XBMC for myriad platforms — even the diminutive Raspberry Pi!



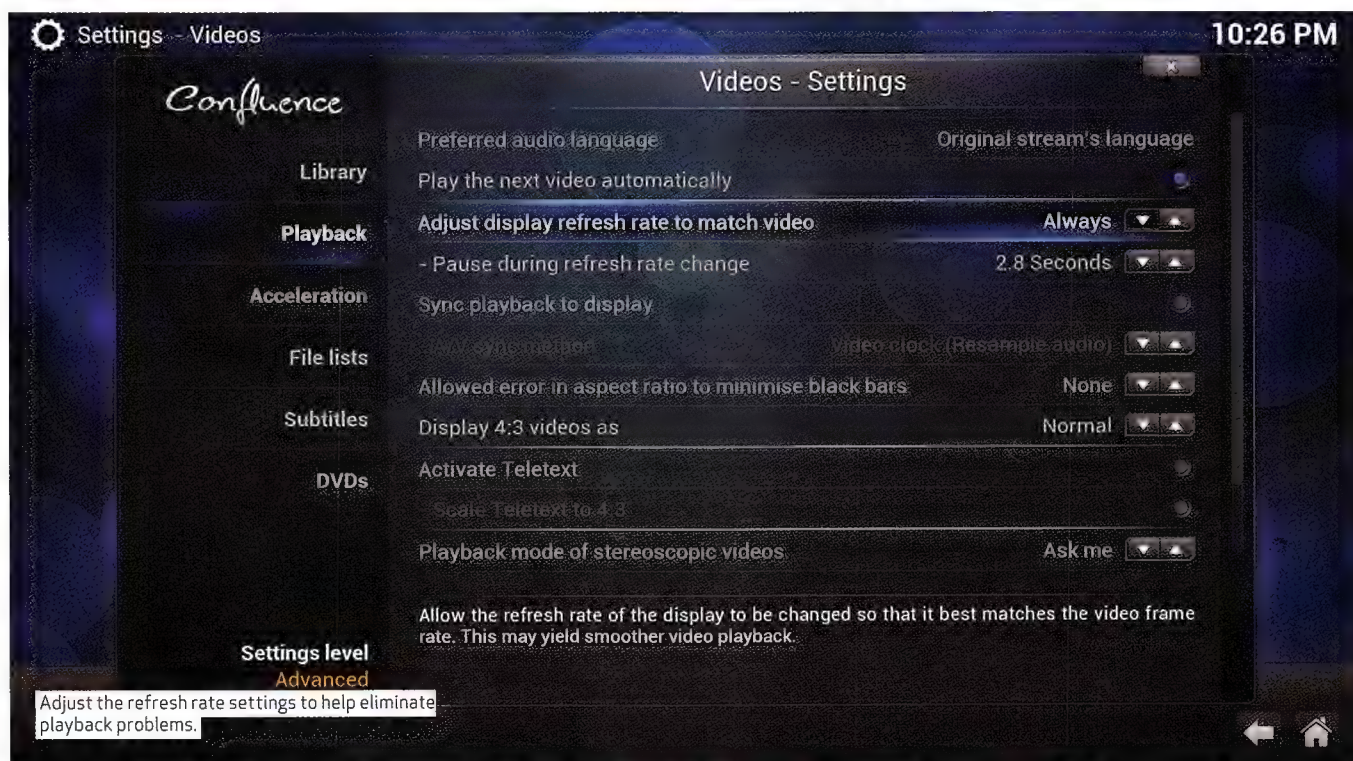
A quick note that most of the changes we've outlined in this story require you to be viewing the Advanced settings level — you can toggle this from any settings page down the bottom left. And don't worry too much about making mistakes — you can always reset any changes you've made in a specific category by selecting 'Reset above settings to default' at the bottom of each settings list.

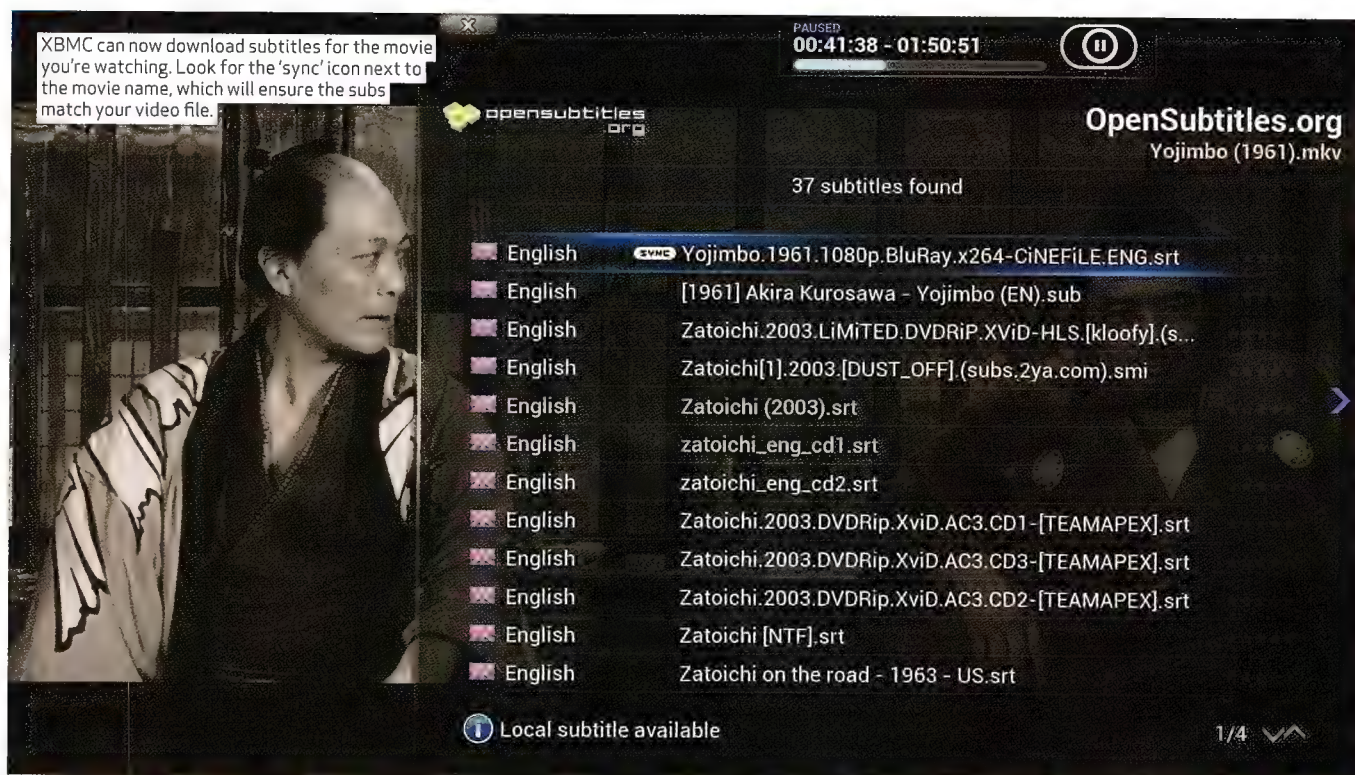
PLAYBACK SETTINGS

By default, XBMC should be able to play pretty much any video file you can throw at it, but that doesn't mean it's necessarily set up best. Here are the tweaks you should make and settings you should enable for the best viewing experience. The most critical settings for playback are all located in 'System > Video', so head there first.

■ Ensuring smooth playback.

Stuttering is one of the most annoying faults that can happen with digital video — and can be caused by all sorts of elements — but XBMC gives you a couple of options that can help eliminate the more common causes. In essence, you can choose to either get XBMC to sync video playback to suit your TV, or get your TV to adjust to the video. The second option is the better one and most TVs bought in the last 5 years should easily support it. (The sticking point for older TVs is whether they support 24Hz refresh rate, which is required for the 24fps rate of most Hollywood flicks.) To enable this option, set 'Adjust display refresh rate to match video' to Always. You might also want to enable 'Pause during refresh rate





change' which will ensure your video doesn't start playing before your TV is ready – we found setting it to around 2.5 seconds worked on our test TV.

- While you're here, you can also optionally set 'Preferred audio language' to match your preference – this will take effect on foreign movies with multiple audio tracks. If you like to binge-watch whole seasons of TV, we'd also enable 'Play next video automatically'.
- Enabling hardware acceleration. If your media PC has a half-decent GPU in it (such as a standalone graphics card or a CPU from Intel or AMD that's less than 3-4 years old) then you'll want to leverage it for playing back movies and TV – particularly HD content. This will lessen the load on

your CPU and should give you less errors in playback compared to using the alternative (software video rendering) which tasks your CPU with the whole job. Go to 'System > Video > Acceleration' and, if available, select 'Hardware accelerated' for the 'Decoding method' and also ensure 'Allow hardware acceleration (DXVA2)' is enabled. You can leave the top 'Render option' on auto, but you may wish to experiment with different options to see if you prefer the picture quality.

- Downloading subtitles. As of the latest version of XBMC (13), you can download subtitles for a movie while you're watching it. You'll first need to enable this by adding providers, so head to 'Settings > Video > Subtitles',

select 'Default Movie Service' and pick a provider or two from the list – we'd suggest both **OpenSubtitles.org** and **Subscene.com** as these are two of the biggest subtitle web sites. There's no limit on how many providers you can have installed, and it's worth having at least a few, in case your preferred service doesn't have what you need.

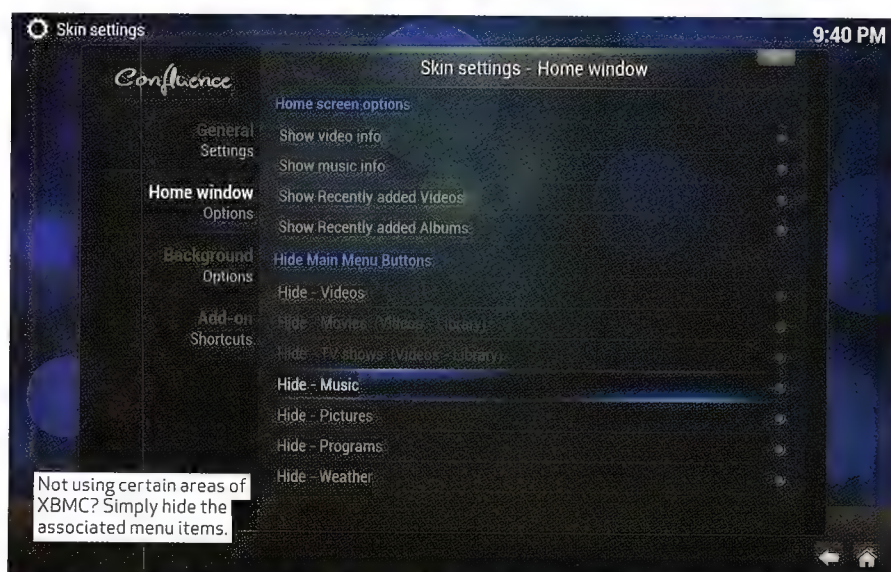
To download subs for a movie you're watching, open up the OSD by hitting the M key and then select the subtitle icon and select Download.

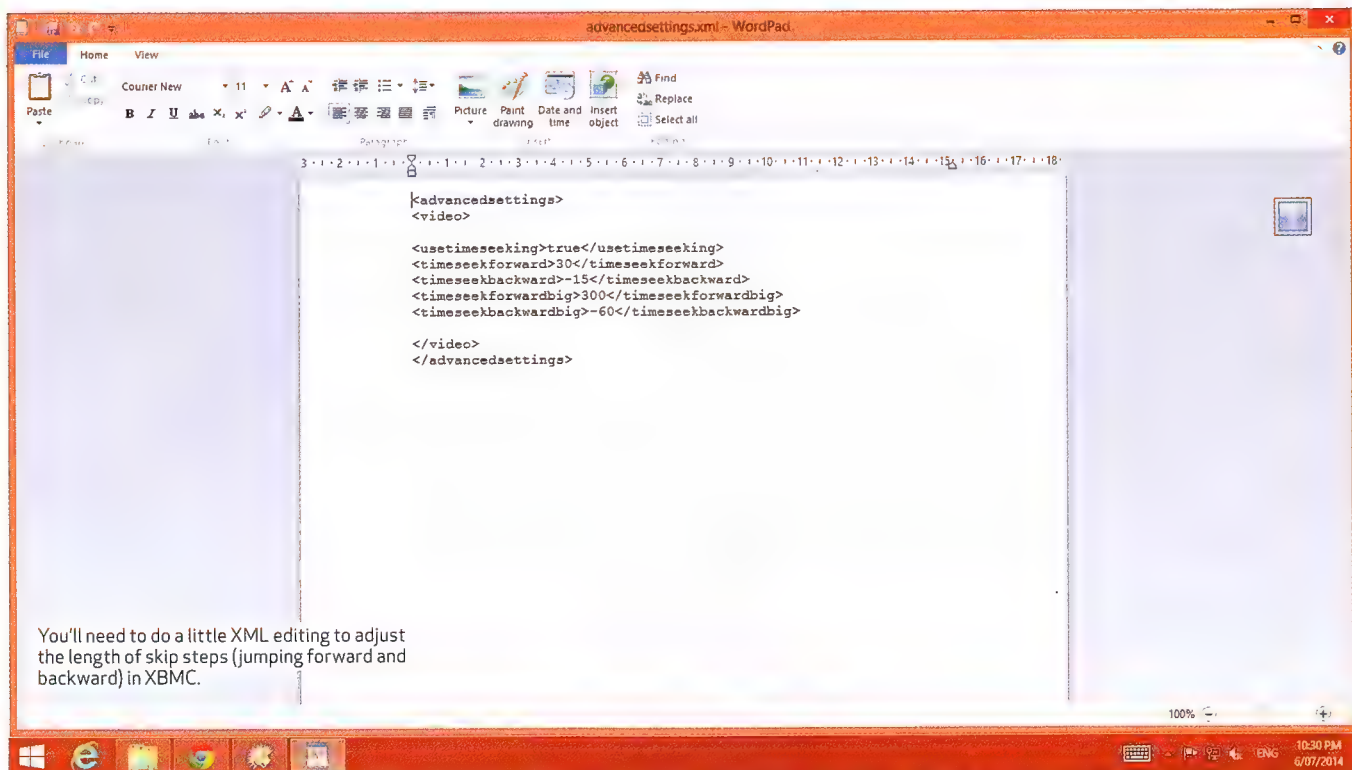
CUSTOMISE THE INTERFACE

The XBMC interface has seen lots of fine-tuning and honing over the years, particularly around ease of use, but you might want to customise it to better fit your own uses. (It's also possible to completely re-skin XBMC for a whole new look or to suit a different focus – see page 54 for using PlexBMC and the Amber skin, for example.) Some of this

NO SOUND?

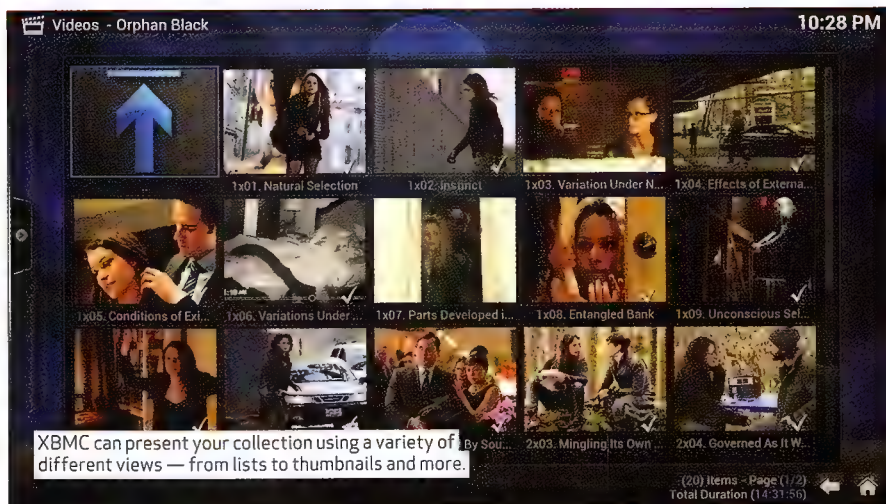
On first set up, XBMC can sometimes select the wrong audio output device – we've found this to especially be the case if you're using HDMI for both audio and video. Check under 'System > System > Audio output' and select 'Audio output device' to be presented with a list of options. In Windows, you may be fine simply selecting 'DIRECTSOUND: default'.





customisation is easy, but often it requires digging into and editing text in XML settings files, which can come with some risk — always make a backup copy before you go in editing.

- **Ditching unused menu buttons.** One of the easiest tweaks is to hide unwanted menu items on the home screen for features you don't use — such as Weather or Programs — although these settings are, somewhat ironically, a little hidden themselves. Using the default XBMC skin (called 'Confluence'), head to 'System > Settings > Appearance > Skin' and then select 'Settings', then 'Home window'. In the list on the right, you'll find options to hide all of the main menu buttons (with the exception of system), so you can pick and choose as you please.
- **Custom skip steps.** Skip steps are a very useful navigation aid for watching digital video, letting you instantly jump forward or backward by a preset number of seconds (or optionally as a percentage of the video). In XBMC, pressing the arrow keys or directional buttons on your remote will jump forward or backward in either 15 or 30 second increments (left/right are 15 seconds, up/down are 30 seconds). To change these in Windows Vista/7/8, you'll need to edit the file `advancedsettings.xml`, which is squirreled away in your user data folder — to get there, press Windows-R, type `%appdata%\XBMC\user data\` and hit Enter. The `advancedsettings.xml` file should be right at the top underneath the folder list — make a copy of it, then right-



click on it and select 'Open With', 'Choose default program' and then WordPad. (If you can't see the latter, you may need to hit 'More options' and also 'Look for another app on this PC' to find it.)

In WordPad, the elements you want to change are the numbers associated with each `<timeseekforward>` and `<timeseekbackward>` entry — the 'big' ones are associated with the up/down arrow keys, while the regular ones are left and right. To give an example, if you want to make the up arrow key skip forward in your video 5 minutes, change the number next to `<timeseekforwardbig>` to be 300 (ie. 5 x 60 seconds). For backwards skips, make sure you include the - symbol in front of each number, otherwise you'll skip forward.

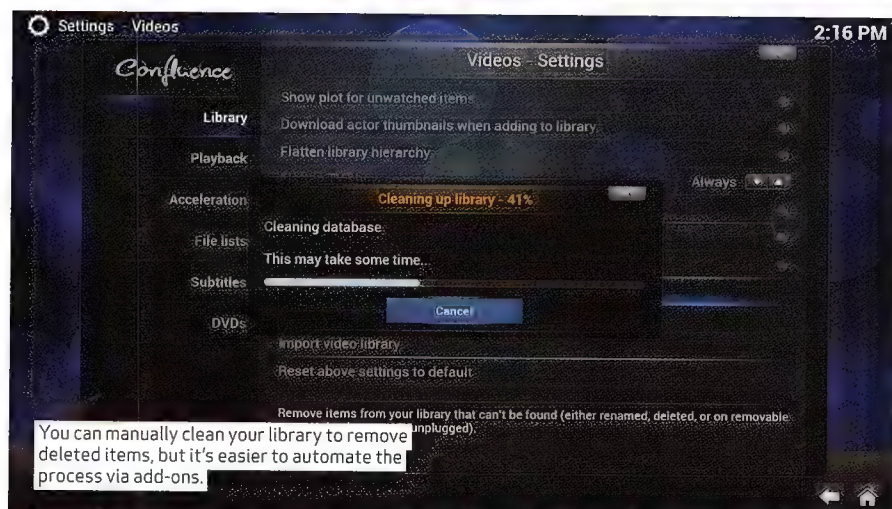
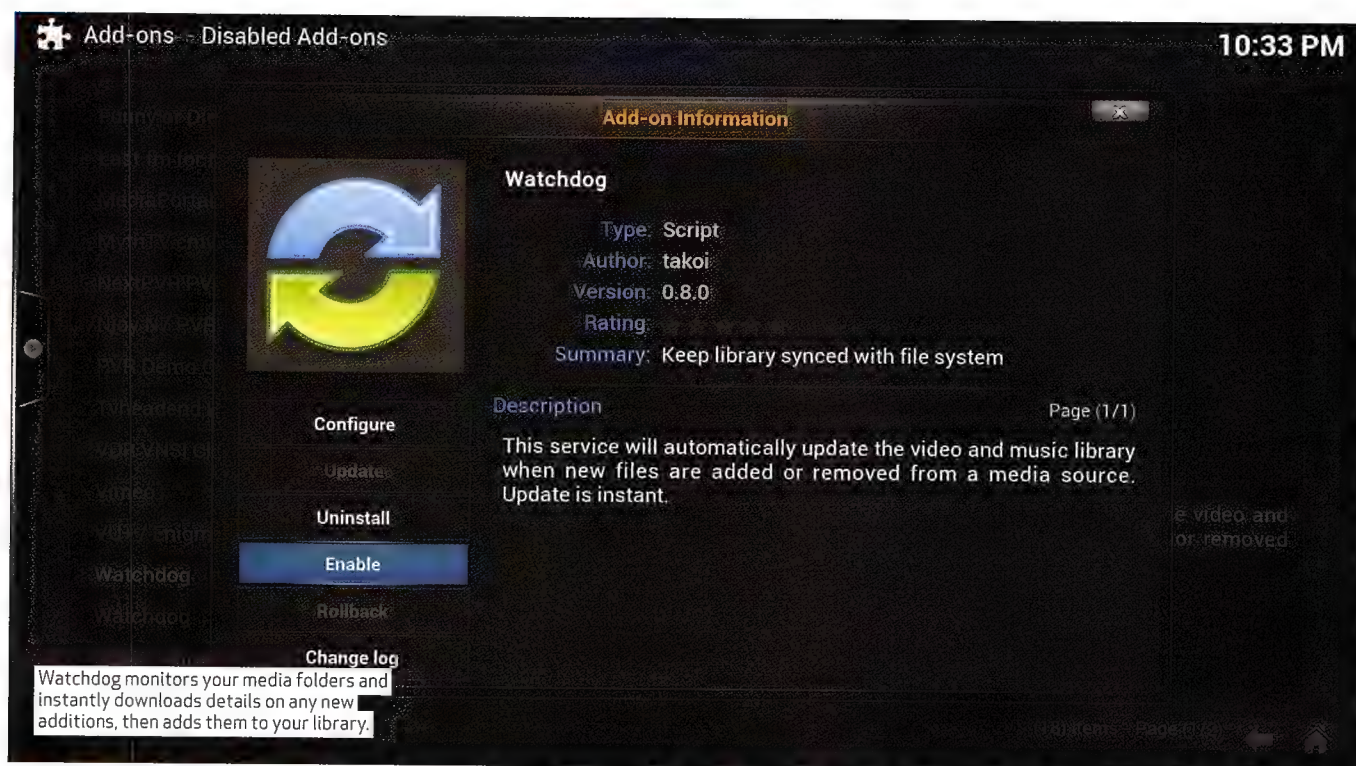
As we mentioned above, you can also

change skips steps to be a percentage of the video — check out the XBMC wiki at tinyurl.com/86585dn for more details on this.

LIBRARY MANAGEMENT

Alongside its TV-friendly interface, XBMC's biggest advantage over using say, VLC or another generic media player, is that it can scan through your TV and video files and automatically fetch related information (such as synopsis, cover art and other assets) about them from the web. By default, XBMC pulls all of this information (known as metadata) from two community-run database web sites: themoviedb.org and thetvdb.org (for films and TV, respectively).

Here's how to make XBMC play nice with your media collection and customise what's presented.



- Correct file naming. It's worth noting that XBMC does rely on you being reasonably orderly in the way you store your files for it to be able to correctly identify items. TV shows and movies, for example, need to be kept in separate folders and when you rip or download something, it's important to name it in a format that XBMC will recognise. That means, for example, naming movies in the format 'Movie name (YEAR)' (ie. 'Star Wars: A New Hope (1977)') and TV shows within a folder with the show name, with files named 'TV show name - season and episode number' (ie. 'Cheers - 5x15'). XBMC can recognise a few different naming conventions for season and episode number formatting (such as 's05e15' instead of '5x15'), but we'd recommend sticking to one format for simplicity. (Sick Beard uses the '1x01' format –

and in fact, even if you're not using Sick Beard's downloading features, it can also be a great way to recognise, organise and rename your TV shows.) If you follow the above naming rules, you should get correct matches 99.9% of the time.

- Repairing mismatches. However, movie and TV identification isn't perfect in XBMC and it will occasionally misidentify a show or movie as something else, or just fail to recognise it completely. (We've found this is often caused by confusion about the release year of a movie – IMDb, for example, might list a film as being released in 2013, whereas themoviedb.org reckons it was 2014.) To rectify mismatches, navigate to the movie or TV show (for TV, select the show name, rather than an individual episode) and press I to open the information panel). Select

Refresh and then Yes on any prompts until you're presented with a new list of matches to select from. If none of these are correct, you'll need to select Manual to the right and try some different names – if the movie or TV show is foreign, try using its original name rather than its English translation. For movies, you can also try leaving the year off, which should give you a few more results to choose from. Once you're happy with a match, select it and XBMC will update its entry to use the new info.

- Identifying missing movies and TV. Occasionally, you might find some of your media files aren't identified at all, meaning they won't even be visible in your library. (As a quick aside, you can always navigate to and play these by going to 'Videos > Files' and then browsing through the raw file listing.) To find the culprits, grab the 'Missing Movie Scanner' add-on by going to 'System > Add-ons > Get Add-ons > All Add-ons > Video Add-ons' and installing it from the list. You can then launch it from the main menu by selecting 'Video > Add-ons', after which you'll be prompted to scan either your movie or TV sources. Once done, Missing Movie Scanner will provide a list with the full path of any files that aren't in XBMC's library. From here, you can do a search on themoviedb.org or thetvdb.org for that particular item, then rename your files/folders so they match what's in the database.
- Automatic library updating. When you first install XBMC and point it at your movies and TV shows, it will scan through and do its best to find

matches for each one. However, by default it's not set up to scan for new stuff. While you can do this manually from within your main lists of TV or movies (hit the left arrow to open the side panel then select 'Update library'), it's a bit dull to do this every time you add something new. At the very least we'd suggest heading to 'Settings > Video > Library' and turning on 'Update library on startup'. However, a better option is to grab one of two add-ons which can automate the whole thing — they are Watchdog and XBMC Library Auto Update, which can be found in the Services and 'Program Add-ons' repositories, respectively.

So which is right for your set up? Watchdog is the faster and more user-friendly of the two, as it constantly monitors your media folders for file changes and will add or remove items on-the-fly based on this. It's the best option if all your media is stored directly on your media PC (i.e. not on an external NAS box). If you are using a NAS, Watchdog can be a bit of a burden as it'll constantly be polling the device looking for file changes — that'll stop your NAS's hard drives from sleeping (and potentially drive up your power bill). In the latter case then, XBMC Library Auto Update is the better option; it updates your library on a set schedule (which you can change to suit your preference).

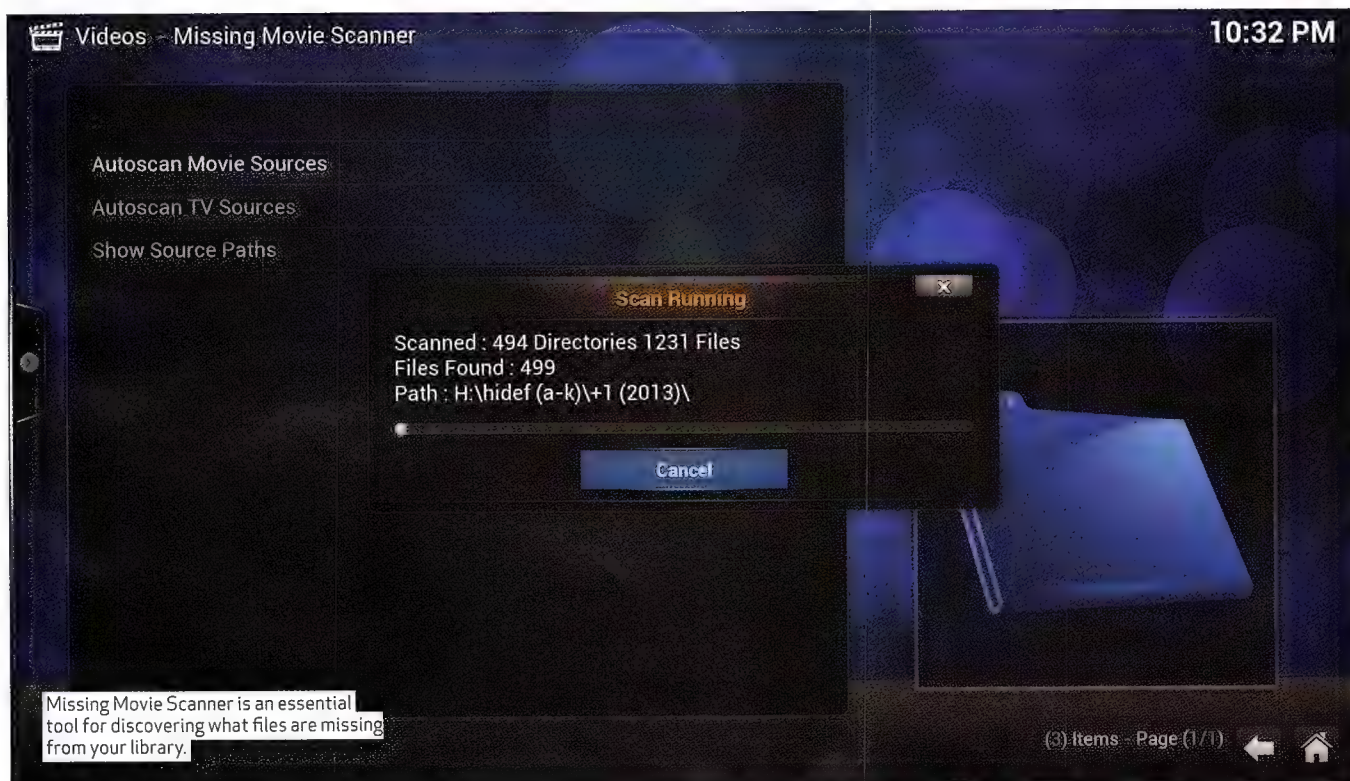
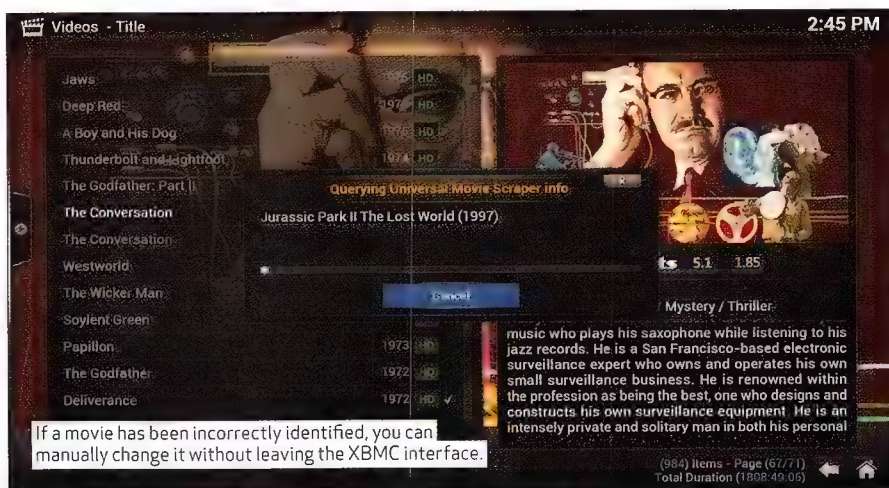
Watchdog shouldn't need any settings adjustments after its installed, but if you're using XBMC Library Auto Update we'd suggest enabling the Clean Libraries feature (select Configure from

the Information page, then the Cleaning tab to find this). This will ensure any media files you delete are removed from XBMC's library. You might also wish to adjust the update period on the General tab — it's set to 4 hours by default, but you can lower this to as little as 1 hour.

■ Customise your movie info. The last tweak related to library maintenance is switching from the default movie scraper (**themoviedb.org**) to the more flexible Universal Movie Scraper (UMS). (You can find it under the 'Movie information' area of Add-ons.) UMS offers much more control over where the movie information used to populate your library comes from. You can select to have it all come from IMDb rather than The Movie Database, for example, or use a mix from those two plus Metacritic or Rotten Tomatoes. What specific settings you use is

TOO LOUD?

If you're finding a lot of variance between the volume levels of your videos — for example, some are pants-shatteringly loud while others require you to turn the volume way up — then try this fix. Go to 'System > System > Audio output' and disable 'Normalize levels on downmix'. This can reduce the dynamic range of audio (meaning the difference between soft and loud sounds in a video won't be as pronounced), but it should mean you're not constantly turning the volume way up or down to deal with different files.



STREAMING TO iOS & ANDROID

How to set up local and remote streaming of your collection for your smartphones and tablets.

While we've opted for XBMC as our preferred media player because of its configurability and huge range of useful add-ons, if you want to stream to Android and iOS devices, however, you really can't go past Plex (plex.tv). Plex is, in essence, a commercial spin off of XBMC, but its media serving abilities have actually become superior to its open-source counterpart. Like XBMC, Plex can scan through your media files and create a great-looking library complete with cover art and detailed information, but it can also transcode your videos so they're suitable for streaming.

The good news is that there's no reason you can't have both XBMC and Plex running on the same machine, with XBMC as your big-screen player and Plex working behind the scenes to serve your portable devices.

Like XBMC, Plex setup is very straight forward, but it's been split out into two components — for streaming, you want Plex Media Server (available for Mac, Linux and Windows from plex.tv/downloads). Once you've gone through the setup wizard, you can manage your Plex library from a web browser — in Windows, right-click on the tray icon and select 'Media Manager'.

For local streaming over your Wi-Fi network, Plex does come at a slight price: you'll need to purchase the mobile apps which are available from Google Play for ~US\$5 and the iTunes App Store for \$6.49. If you're patient, however, we've also seen them both go on sale fairly regularly for as little as US\$1.

RELIABLE REMOTE STREAMING?

If you're just streaming your videos at home, then all you'll need is a solid Wi-Fi connection. If you're wondering about the possibility of streaming your collection remotely — while you're at the office,

commuting, or to family and friends — you're probably going to run into a wall due to upload speed limits.

Most Australian homes on broadband will have an upload speed somewhere between 500 to 2,000Kbps and the latter only if you're on a cable internet connection or if your ADSL-based ISP supports a technology called Annex M. You can still stream video at those rates, but you're going to have to settle for lower (sometimes much lower) quality than you'll get at home.

If you want to try your luck, here's what we recommend:

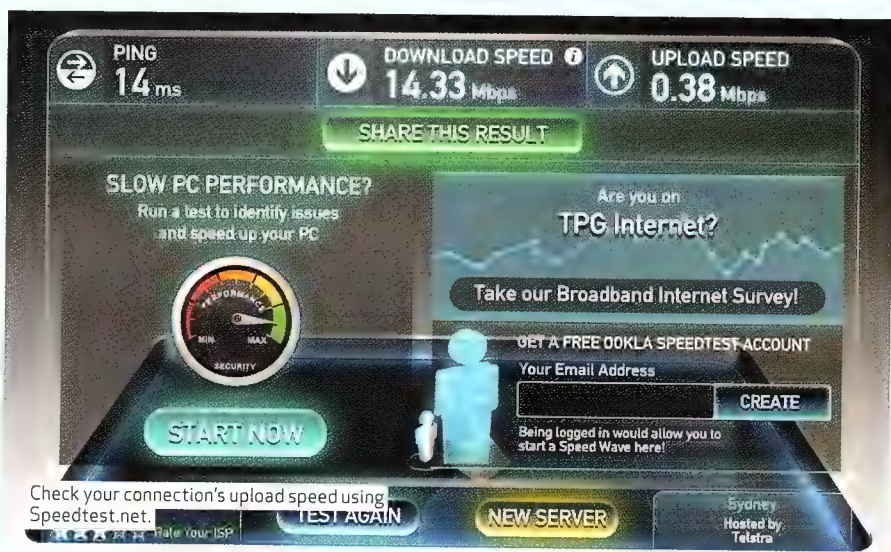
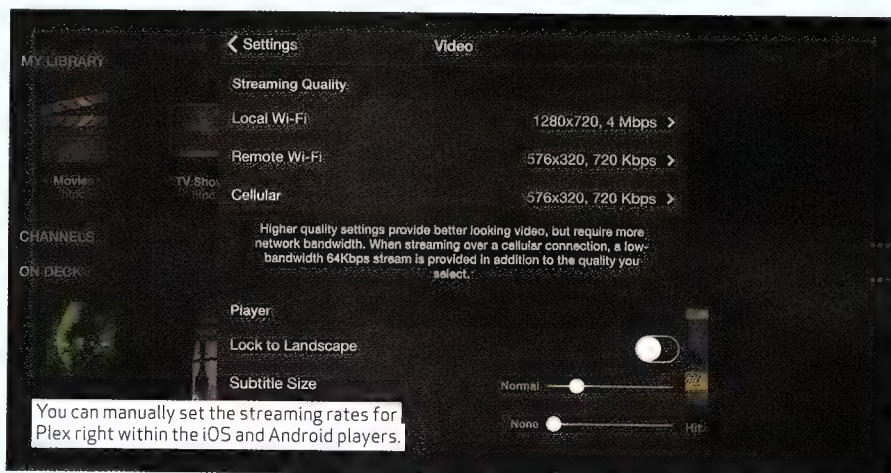
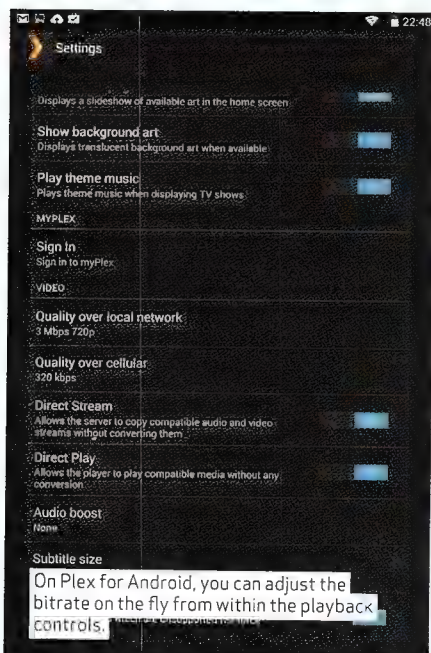
- Sign up for a free myPlex account, which makes connecting your smartphone or tablet to your server much simpler when you're out and about.
- Connect the PC running your Plex server to your home router with a wired connection, which will reduce any chance of wireless signal fluctuation causing stuttering.
- Test your home connection's upload speed at www.speedtest.net to find out what your realistic upload rate is. This can vary hugely depending on your physical connection and ISP.

- Adjust the streaming quality for Cellular and Remote Wi-Fi connections (found under Settings on Android and 'Settings > Video' on iOS) to 720Kbps. If you're still experiencing pauses or stuttering, try lowering it to 320Kbps.

A better alternative to streaming is syncing your media to your mobile device before you leave the house. With Plex, syncing is something that you'll have to pay more for. You'll need to sign up for a subscription, which start at US\$4 a month or can be waived for a one-off payment of US\$75.

PLEX ALTERNATIVES

We understand if some people balk at Plex's pricey sync option, but thankfully it isn't the only way to stream and sync your media to portable devices — at least not on iOS. For iPhone and iPad fans, Air Video HD (www.inmethod.com) does local streaming and transcoding as well as syncing and only costs the price of the iOS app itself which, at the time of print, was US\$3.79. It's entirely file based, so it won't create a slick, info-filled library like Plex, but for basic functionality it's a great alternate. For those on Android, we sadly haven't found a media transcoder that also offers syncing.

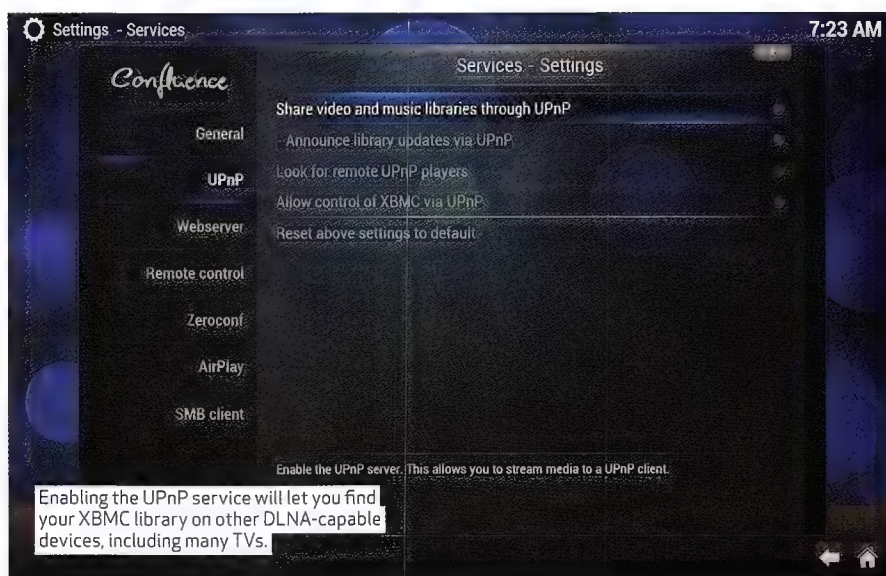
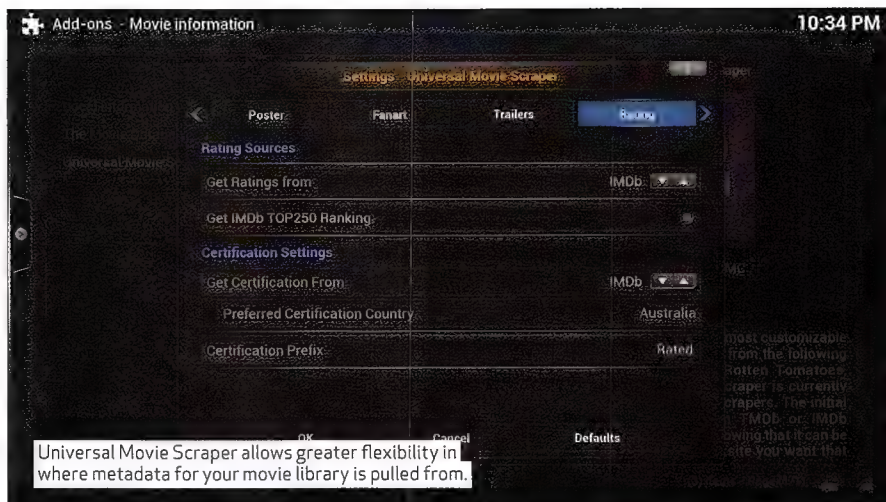


entirely up to you – we configured our test machine using movie names and information from IMDb, fan art from The Movie Database and ratings from Metacritic.

A quick note on setting up UMS – if you've added a specific master movie folder to your library, you'll need to go in and change its source settings. Select 'Videos > Files' and then highlight your movie folder and either right-click it or press C on your keyboard. From the pop-up window, select 'Change content' and choose Universal Movie Scraper from the list to the right. Click OK and, when asked if you want to 'refresh info for this path', select Yes. Because you're switching scrapers entirely, XBMC will need to wipe your old information and rescan your movies, grabbing all the data through the UMS.

STREAMING TO OTHER DEVICES

XBMC can also stream your collections to other media playback devices using the DLNA protocol, which includes most TVs made in the last half a decade. Unfortunately XBMC doesn't do transcoding of video – so your playback device will need to natively support the file format your media is in, something that still provides problematic with MKVs. To turn streaming on, head to 'System > Services > UPnP' and enable 'Share video and music libraries...' and leave 'Announce...' switched on too. That's all that's required for streaming to work – now just head to your playback device and XBMC should appear in the list of media sources. ■



GETTING PLEX & XBMC TO PLAY NICE

As we've said in the separate story on page 54, there's no reason you can't run XBMC and Plex separately and just let them each independently index your media files. However, it does make sense from an ease-of-management point of view to just have Plex manage your library and then have XBMC pull the info it needs from it.

Thankfully, some enterprising members of the XBMC community have thought the same thing, and getting the two talking is possible – all it requires is you to install an Add-on and a new skin. To get the Add-on, you'll need to add a new repository to XBMC's Add-on area. Download the zip file from tinyurl.com/nvzbbxk then, in XBMC go to 'System > Add-ons > Install from zip file' and select the zip to install it. You'll now find a new, fourth option when you select 'Get Add-ons' – 'PleXBMC Add-ons for XBMC'. Select the latter, go to 'Video Add-ons' and install PleXBMC from here.

Now, by default, to use PleXBMC you'll need to navigate to 'Videos > Add-Ons >

PleXBMC pulls movie and TV metadata, including slick imagery, right from your Plex server.



PleXBMC' and it'll only show your videos in a list. The way around that is to switch out the default XBMC skin (called Confluence) for a different one that's specifically designed to use PleXBMC. There's more than one of these, but the best is Amber; download it by heading to 'System > Appearance > Skins', selecting the top menu item (which should read 'Skin - Confluence') and then 'Get More...' on the right. You'll then be able to

select and download Amber from the list.

With Amber installed and enabled, head back to the home menu and you'll find that when you hover over Settings, there's a smaller 'Go Plex' button. Select that and you'll be switched over to a version of Amber that pulls your Plex library in a much more visual fashion, with full cover art, synopsis and more.

Couch controllers

Perfect integration of your media PC requires the perfect peripherals. Craig Simms tests couch-friendly keyboards and remotes.

Having the right accessories for your media PC is vital, and a small wireless keyboard and remote are worth their weight in gold. Perfect for the coffee table, they offer control at a comfortable distance from the PC and TV.

KEYBOARDS

Apart from functions like text entry and quick-jumping to movie/TV titles, a keyboard is crucial for when things go wrong and you need to diagnose the problem. Unless you want to game on your media PC, an integrated touchpad will also suffice for a mouse.

Wireless keyboards tend to use radio frequency (RF). Unlike infrared (IR), RF doesn't rely on line of sight. It can be useful for hiding media gear in cupboards, or the next room. Yet depending on conditions, range can be problematic. In our testing environment, at around the 4.5m mark every one of our non-Logitech RF keyboards would drop letters and start performing erratically.

The fix was simple – dangling the receivers off a short USB extension cable instantly gave us about 10m range. We can only assume the cable acts as an antenna.

REMOTES

A dedicated remote speaks a universal language. Everyone in your family will know what the pause button does, but some will struggle to remember that spacebar on a keyboard does the same thing. As a general rule, you'll want a Media Center Edition (MCE) remote. A universal remote could also fill the gap, controlling your TV and other equipment as well.

You'll likely need a receiver too. RC-6-compatible is ideal, as most apps including XBMC understand the protocol. HP receivers are popular, and can be found readily on eBay. If you can't find one, non-RC6 alternatives include Flirc (translates buttons from any remote into key

ASSIGN BUTTONS ON YOUR REMOTE FOR XBMC

REMOTE BUTTON	ACTION
MEDIA CENTER BUTTON	LOADS XBMC FROM WINDOWS, OR RETURNS TO XBMC HOME. (NOTE THAT THIS REQUIRES AUTOHOTKEY TO BE INSTALLED.)
INFO	PLOT SYNOPSIS.
DVD MENU	MEDIA CONTROLS.
GUIDE	CONTEXTUAL MENU/PLAYLIST.
RECORDED TV	CODEC INFORMATION.
RED/CLEAR	FULLSCREEN MODE.
TELETEXT	SMARTFOCUS. ALWAYS KEEPS XBMC ON TOP.
ENTER	ZOOM MODE.
#	TOGGLES XBMC BETWEEN MULTIPLE SCREENS. DOESN'T SCALE WELL WITH DIFFERENT RESOLUTIONS.
*	RESCAN LIBRARY.
POWER	MENU FOR POWER OFF, SETTINGS, FILE MANAGER, MORE

"Everyone in your family will know what the pause button does, but some will struggle to remember that spacebar on a keyboard does the same thing."

presses) and HDMI CEC (which, providing your TV supports it, allows your TV remote to be used with your media PC).

RC-6 receivers should set themselves up automatically in Windows Vista and newer, registering as a "Microsoft eHome Infrared Transceiver". Paired with any MCE RC-6-compatible remote, media and directional buttons will work in XBMC out of the box.

By default the remote's power button will put your PC to sleep and wake it again, but you won't be able to turn your PC on from a completely off state. To do this, you'll need extra hardware like the Simerec PCS-2 (www.simerec.com/PCS-2.html).

You can enable more buttons on your MCE remote by installing the Customised MCE script (xbmccustomregis.sf.net), which assigns them as above



Get the kit you need

For Logitech Harmony remotes to talk to an RC-6 receiver, you'll need to add three Microsoft devices: MCE (media controls), MCE keyboard (keyboard) and MCE SE (keyboard combinations that use Alt, Ctrl and Windows key).



\$58 | WWW.NEWMAGIC.COM.AU

Hauppauge Media Center Remote Control Kit

This standard MCE remote hits the spot.

For Australian retail availability, Hauppauge's offering is pretty much the last product standing in the dedicated RC-6-compatible field. It's fortunate then that it's pretty good.

An all-black, tasteful number, the buttons register with the same satisfying solid squish that you expect from a TV remote, a green light at the top flashing with each press.

The button layout could use improvement. The thumb naturally rests on the green Media Center button, forcing it to stretch up to the most often used directional and OK buttons. The back button is tiny, as are some of the media control buttons. As a basic remote, there's no backlighting to help make hitting those buttons easier.

The receiver is a petite 55 x 50 x 22mm, and comes with a detachable 1.8m USB cable, a suction cup for mounting and an IR blaster for changing channels on a set top box.

While the lure of universal remotes is strong, if you want a remote just for your media PC that will truly "just work", Hauppauge delivers.

Verdict



\$79.95 | WWW.LOGITECH.COM

Logitech Harmony 650

The bang for buck option.

The Harmony 650 is now great value, with Officeworks selling it for \$59 at the time of writing. We've seen it go as low as \$40.

While the packaging says it supports five devices, the latest software enables eight. Buttons are well laid out, the colour screen is easy enough to navigate and the backlighting automatically kicks in when you pick up the remote.

Despite adjusting inter-key delays and command repeats in Logitech's MyHarmony software, the Harmony 650 produced noticeable lag when navigating compared to the precise Hauppauge remote.

MyHarmony itself is reasonably straightforward, but each action requires far too many steps, pages can be slow to load, and it requires you to log in to its service online to use.

Frustratingly the delay between TV power on and input switching isn't in MyHarmony – it has to be set on the remote by holding the Help button.

It has its shortcomings, but if you can get the Harmony 650 on special, they can be overlooked.

Verdict



\$399.95 | WWW.LOGITECH.COM

Logitech Harmony Ultimate

The top of the line.

The very expensive backlit Harmony Ultimate comes with a charging dock and touchscreen. It supports customisable gestures, making navigation a breeze.

The centre of the package is the Harmony Hub, an RF receiver that emits IR and comes with two additional IR blasters. The remote can emit IR as well.

Wi-Fi and Bluetooth capability means that devices like Sonos, Roku, Philips Hue and Playstation 3 are controllable, although at the time of writing the power off command for PS3 was broken. In tandem with Logitech's Harmony app, Wi-Fi also enables your smartphone to act as a remote.

Up to 15 devices and 50 favourite TV channels with user-assignable images are supported. Each button supports short and long press operations, and of course are all fully customisable.

While the RC-6 navigation delay was less than the Harmony 650, it was still noticeable, and the lack of dedicated previous/skip buttons is regrettable.

The Harmony Ultimate is an amazing universal remote – provided you're willing to pay the price.

Verdict





\$169.95 | WWW.LOGITECH.COM

Logitech Harmony Smart Control

Phoning it in, in a good way

Logitech offers two paths if you can't justify the Harmony Ultimate: the IR only Harmony Touch, which excludes the Hub and costs \$249.95; or the cheaper Harmony Smart Control, which comes with the Hub, a single IR blaster and a simple touchscreen-less remote.

Setup of the Smart Control Hub is initially performed over Bluetooth using your iOS or Android phone, then continues over Wi-Fi. A small snag: we needed to update the firmware on our router before things would work properly. The Hub can also be configured by connecting it to your PC and using the MyHarmony desktop software, which is also required to customise the buttons on the included remote control.

The Harmony app supports one and two finger gestures, has media controls and allows you to add custom buttons to your devices. Managing up to 8 devices and 50 favourite TV channels with custom logos, the Smart Control had the lowest RC-6 navigation lag of all the Harmony remotes we tested, both over smartphone and with the included remote.

Verdict



\$74.99 | WWW.XBOX.COM

Xbox 360 Wireless Controller Bundle

Not just for gamers.

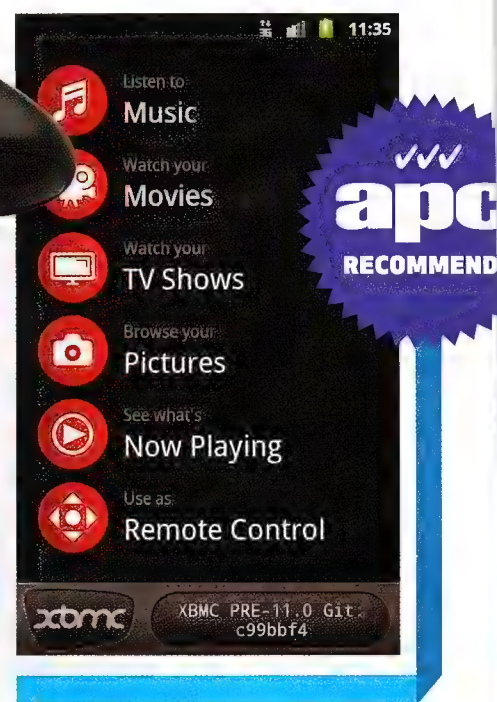
The Xbox 360 has long been lauded as having one of the best gaming controllers around, and it just so happens it'll work fine with your PC.

While you can cheap out and get the cabled version of the controller, we'd recommend buying the full Wireless Controller Bundle. This includes the Play and Charge Kit, giving you wireless connectivity and a rechargeable battery.

There is a caveat: you'll also have to purchase an Xbox 360 Wireless Gaming Receiver to enable that wireless capability on your PC, which supports up to four controllers. Be aware that if you want the authentic Microsoft Wireless Gaming Receiver and not a knock off, the Microsoft logo is on the top and the bottom of the receiver.

While not providing the typical remote experience, XBMC comes fully Xbox 360 controller aware, and we find it to be one of the most enjoyable solutions. Those who already own an Xbox 360 will find it incredibly intuitive. Its only down side? Non-gaming relatives will continuously ask you which button does what.

Verdict



FREE | GOOGLE PLAY OR THE APP STORE

XBMC Remote apps

For those who do everything with their phone.

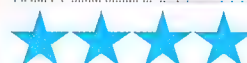
If you don't want to stump up for a hardware remote, you could always use software on your phone.

After enabling XBMC's web server, a whole raft of apps are available which will allow you to control, browse and playback your media library over your own wireless network.

On iOS, we recommend you stick with the official XBMC remote. It's free, speedy and offers both standard navigational controls and gestures. You can jump to a specific point in time in a currently playing file; browse your media collection by name, genre or most recently added; and of course read all the synopses along with associated movie posters/album covers.

If you're an Android user, you get the ability to push SMS and incoming call notifications to your TV. But the official app isn't the best way to go — we recommend Yatse instead. It offers a superior interface, audio stream and subtitle selection, rudimentary voice control, and if you pay for the unlocker, custom skins and the ability to stream media to your phone.

Verdict



COUCH-FRIENDLY KEYBOARDS



\$62.70 | WWW.ENCOMTECH.COM.AU

Rii Mini N7

This tiny keyboard does surprisingly well.

Well-built with solid feeling key presses, the Mini N7 integrates a keyboard and trackpad into something barely bigger than your mobile phone.

The package includes a pre-paired RF dongle and 80cm USB charging cable. While suffering initial range problems, these were overcome using our USB extension cable technique.

Usefully, the N7 includes a Ctrl-Alt-Del button, and holding down FN while using the trackpad scrolls. Sensitivity of the trackpad can be adjusted, and basic media buttons are included here as well.

It's not all smooth sailing. It can be slow to wake after it hibernates, taking around two seconds to resync with the receiver after a button press. That press isn't sent to the receiver, requiring you to hit your desired button again.

While the N7 is backlit, it requires you to press a button to turn it on. The ergonomics aren't as good as its brother, the i8, with a browser shortcut in the middle of the D-pad instead of an OK button, and the touchpad can be difficult to reach.

Verdict



\$69 | WWW.ENCOMTECH.COM.AU

Rii Mini i8

A step up in usability from the smaller Mini N7.

The Mini i8 has the same sturdy and satisfying build as Rii's Mini N7, with significantly better ergonomics. While larger, the curve sits more comfortably in your hand, with the touchpad easy to reach with thumbs.

Basic media controls are broken out into their own section, while unlike the N7 a more useful OK button is featured in the middle of the directional controls.

It's a rechargeable keyboard, coming with an 80cm USB cable and a pre-paired RF dongle. As with most of our RF keyboards, we suffered range problems until instituting our USB extension work-around, whereupon we extracted the full 10m.

Otherwise has all the quirks of the N7, including the Ctrl-Alt-Del key, trackpad sensitivity adjustment and the lag waking up from hibernation.

One thing we missed was the incredibly useful backlight. If Rii managed to upgrade the i8 with a smart backlight that turned on whenever you touched it or picked it up, it could well be the perfect media keyboard in this roundup.

Verdict



\$59 | WWW.RAPOO.COM

Rapoo E2700

Not the droid you're looking for.

With strong geometric lines and a brushed aluminium casing, the 254mm long E2700 looks like a premium product. A complete set of media control keys line the top row, relegating F1-F12 as secondary functions and positioning the E2700 as a media PC keyboard.

It's definitely intended to be left on a table. Apart from the tilt, the lack of a proper edge around the keyboard means it can be a pain to pick up and carry around. We found ourselves consistently hitting the Esc key with our thumb without meaning to.

The incredibly flat keys and minimal gap between them means tactile feedback is lacking. In combination with high resistance, this makes accurate typing at speed problematic.

To the right is a touchpad, which uses a single finger tap for left click, double for right, and enables two finger scrolling. Just like the Rii keyboards, we had range issues until using our USB extension technique.

We want to like the E2700, but the shortcomings make it hard to recommend.

Verdict





\$69 | WWW.RAPOO.COM

Rapoo E9080

Sometimes bigger is better.

At 366mm long, the E9080 overcomes some of the problems of the E2700 purely by virtue of size. The keys are oversized, but in combination with larger gaps and lower resistance this allows more accurate typing to be achieved.

The lack of edge once again means it's a pain to pick up, and is best suited to being left on a table. It also suffered range problems until we used our USB extension work around.

Unlike the E2700, here the F1-F12 keys take precedence over the media keys, positioning it more as a standard wireless keyboard.

The touchpad functions in almost the same way as the E2700, requiring a triple finger tap instead for right click. Swipe along the bottom of the touchpad though, and with a flashing red light to confirm it turns into a numpad, complete with num-lock-enabled directional keys.

We like the E9080, especially the quality it brings at its price. It would make a decent wireless desktop keyboard, but for media PCs there are better options out there.



\$129.95 | WWW.LOGITECH.COM

Logitech Illuminated Living-Room Keyboard

This chunky keyboard does the job.

At almost half a kilogram with no taper, Logitech's K830 could afford to go on a diet. It is backlit, but unlike Logitech's sublime K810 it's not smart enough to know that you've touched it or picked it up – you'll need to hit a key to turn on the light.

A slew of media keys line the top including a power button, for sending to sleep/waking your PC. The touchpad on the right offers standard tap and swipe controls, and also supports basic gestures like pinch to zoom and left-to-right swiping to switch applications. While not required, Logitech's software allows light customisation of things like function keys and pointer speed.

If you hold the keyboard at opposing ends, the physical mouse buttons under the touchpad and a left click button situated on the top left lip let you control things without having to change your grip.

In the package is a 1.2m micro USB charging cable, and a 1.5m USB extension cable. While we'd ideally like something smaller and lighter, the K830 does the job.



\$69 | WWW.LOGITECH.COM

Logitech Wireless Touch Keyboard K400r

Budget keyboard is budget.

At half the price of the K830, the K400r is of course of cheaper construction. This becomes apparent with the physical mouse buttons, which can best be described as clunky. But at over 100g lighter, it's much better suited to holding.

While missing the backlight of its more expensive relative, it includes the same media keys and power button. Through Logitech's SetPoint software function keys can be customised from a set list, and touchpad sensitivity can be set.

The touchpad supports the standard gestures, including pinch to zoom and double finger tap for right click. As well as the physical buttons below, there's a button at the top left for left clicking.

We did have some minor range issues, but interestingly Logitech includes its own range extender, a 54mm long USB dongle that sits between your machine and the unifying receiver. Plugging this in rendered our problems obsolete.

As a basic keyboard it does fine, and if you're on a budget it will certainly fit the bill. ■

Verdict



Verdict



Verdict



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With three external antennas and ASUS AiRadar, the DSL-AC68U offers up to 150% Wi-Fi coverage.

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ADVERTISING FEATURE

FAST, POWERFUL & RELIABLE

ASUS's DSL-AC68U is a combined modem and router that gives future-proof versatility with the latest tech and the fastest wireless speeds.

The world's first AC1900 xDSL Router, the ASUS DSL-AC68U also has the honour of being the fastest money can buy. But what is an AC1900 router anyway, and why is it so fast? The ASUS DSL-AC68U uses the latest Broadcom BCM47080B0 chipset combined with the BCM4360 transceiver to give 5GHz 802.11ac connectivity and a massive 1300Mbps of bandwidth. Lesser routers use a slower chip to control the 2.4GHz signal, whereas the ASUS DSL-AC68U uses a second BCM4360 transceiver to give a boost from the typical 450Mbps of 802.11n Wi-Fi to 600Mbps. That seems complex, but what it means is that the ASUS router gives you the very best Wi-Fi experience on all your devices, no matter if they are new or old. The ASUS DSL-AC68U is not just a router either –

it has an inbuilt ADSL modem. Even better, it uses dual CPUs to manage Wi-Fi and the internet, to make sure both work at peak speeds while remaining rock solid and stable. It also has powerful hardware NAT acceleration that teams up with Gigabit Ethernet to make sure your there is not bottleneck between your internet and network.

GETTING STARTED

Technical specifications and promise of high speeds are all well and good, but how do these technologies actually help your day to day use? From the minute you unpack the DSL-AC68U it's making your life easier. The built in modem means you don't need two devices – you can plug in your existing ADSL2+ connection. If you are lucky enough to get your internet

upgraded to the NBN or instead use a cable modem, then you can link that modem directly into the dedicated input socket. The modem connection setup is as easy as running the web browser based wizard. From there, ASUS has made it easy for even novice users to control every aspect of their network.

CONNECTING YOUR DEVICES

With your internet online, the next step is to get all your devices onto the network. If you have a relatively new laptop, tablet or phone, it will support the latest 5GHz 802.11 AC Wi-Fi. You can hit the WPS button to easily connect devices and configure the router via the easy to use web interface. The DSL-AC68U has support for the full spectrum of older Wi-Fi equipped devices, making it easy to get them on your network at the same time. ASUS also includes AiRadar technology to

When to use 5GHz vs 2.4GHz.

Your ASUS DSL-AC68U supports both frequencies, but you should switch between them depending on the situation. Older 802.11 b/g/n devices will only support the 2.4GHz band but the router will ensure they still get the best possible speeds.

Use 2.4GHz

- For low bandwidth uses, such as a computer browsing the internet
- For times when maximum range is important
- Compatibility with older devices

Use 5GHz

- For maximum speed
- For streaming 4K UHD video to a media device
- When interference is an issue

ASUS RT-AC68U specs

Wi-Fi: 802.11 a/b/g/n/ac up to AC1900 specification
Frequency: 2.4GHz / 5GHz
Encryption: WPA2/WPA/WEP
ADSL2+ and NBN ready
1x USB 3.0 port
3 x External Antenna
4 x RJ45 Gigabit Ethernet
Support Dual WAN and 3G/4G Data Sharing



Your World on Demand
Sync. Share. Stream.

Thanks to AiCloud, you can also access your network and files from your smartphone or over the internet.



The ASUS DSL-AC68U includes everything you need to get online.

optimise signal strength and give up to 150% coverage. Instead of small internal antennas, the DSL-AC68U uses three large external antennas for better range. It can then use universal beamforming to detect where your devices are located and shape the transmission to give the best signal strength. If you have a gaming PC, NAS device or media player that you want to plug in via RJ45, the DSL-AC68U has 4 Gigabit LAN ports.

UPGRADE YOUR NETWORK

The DSL-AC68U also gives you plenty of options to add new functionality to your network thanks to a dedicated USB 3.0 port. You can easily backup or share files by plugging in a thumb drive or add a USB printer to your network. You can also use the USB port and a 3G or 4G dongle to share a wireless internet connection. With speeds up to 10x faster than USB

2.0, it's also perfect for adding your own networked attached storage via an external HDD. You can even set your DSL-AC68U to download files directly to your USB drive. If you want to want to play back media around your house, the router is ready to stream directly to your smart TV, tablet, laptop Xbox, PS4 or media player.

BE PART OF THE CLOUD

The DSL-AC68U is AiCloud enabled, making it easy for you to access your data whenever you have an internet connection. You can connect via smartphone, or computer – both Mac and PC. You can use ASUS WebStorage to share your files, or you can plug a USB drive directly into your DSL-AC68U and then access those files with your phone or laptop or share them via links with friends and family. ASUS also takes care of keeping your files up to date across different devices automatically with

SmartSync. AiCloud is not just about sharing files either – you can stream media to all your different devices or print remotely.

VPN SERVER & CLIENT SUPPORT

The DSL-AC68U makes setting up your own VPN easy, giving secure and private access to a home network or the internet. You can use PPTP and OpenVPN protocols with no need for a paid VPN or dedicated VPN server. You can also easily turn your networked devices into VPN enabled clients without the need to install any software.

CONTROL & OPTIMISATION WITH ASUS WRT

If you like to monitor and control your network, you will love the ASUS dashboard. The UI is easy to navigate and combines your network control into one intuitive to use setup. If you are a gamer looking to minimise ping or an avid media streamer wanting to maximise bandwidth, the

DSL-AC68U has you covered. With selectable priority of service standards, you can have total control over how data flows around your network. The DSL-AC68U lets you add an extra 6 SSIDs to create custom networks. You could have a guest SSID that limits downloading from the internet or only gives access to the local network. Those with kids can easily restrict certain internet content or only allow access between certain hours.

For more information on the DSL-AC68U, scan in the QR code below on your smartphone or tablet, or visit www.asus.com/au/Networking/DSLAC68U/.





Pioneer's BDR-208 internal drive gives you fast Blu-ray and DVD support.



Create your ultimate movie archive

Want to create high-quality rips from your Blu-ray and DVD movies, but keep a lid on file size? Darren Yates shows you how to build the ultimate movie library.

Thanks to the yes/no/wait-a-minute government policy surrounding the NBN, it's still the case that physical media is arguably the best way to get hold of your favourite movies and TV shows. Problem is, it's far from the best option given how and when we actually want to watch them. We spend so much of our time on the go, it's almost a rare thing to sit down in front of an actual TV and watch a movie. That means we need our entertainment content in a form that supports the growing range of portable devices we all use – and its why ripping and encoding are still important skills to learn.

BEFORE YOU RIP

The mechanics of extracting video from or 'ripping' a disc and encoding video content aren't too complex – but what can make the process a whole lot easier is first thinking about where you're going to watch this content. Sure, you can do a straight rip of a DVD or Blu-ray movie and while that'll be fine for a network media player, it may not be the best option for a portable device like your phone or tablet (hint: it isn't).

RIPPING FOR PORTABLES

If you're planning to rip DVDs and Blu-ray media for viewing on your portable device, you need to do things differently to end up with the best overall result. For example, your phone's limited storage, CPU performance and battery life mean you can't just load a full 1080p-resolution movie rip at its original data play rate or 'bit-rate'. Even if you have 32GB of flash storage, that's enough for just one movie and while the CPU might be able to play the file, the battery will struggle to

make it through to the end.

The simple rule is the greater the video resolution and bit rate of a video file, the greater the demand for CPU performance to decode and play it – and that places greater strain on your device's battery, which will already have to work harder since the device screen will also be on continuously.

So while the process should always start with the best quality rip from physical media, what you do with that content next makes all the difference.

RIPPING BLU-RAY DISCS AND DVDS

Starting with the rip, there are plenty of freeware DVD and Blu-ray disc ripping options available but the two we recommend are DVDFab HD Decrypter

Where to find the software

You can find our APC Simple Video Converter 3 software on our website at apcmag.com/magstuff. While the software has been tested (I use it on my own PC), it comes 'as is' with no warranty – use it at your own risk.

and the classic DVD Decrypter 3.5.4.0. HD Decrypter handles Blu-ray discs with ease (and DVDs too), but DVD Decrypter is the classic tool for ripping DVDs – it's been around for years and still works perfectly well, whether you're running Windows 8 or XP. DVDFab HD Decrypter now also has Mac OS X support.

CHOOSING RESOLUTION

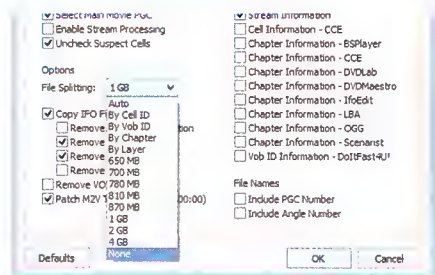
Ultimately, encoding video content for your portable device is all about compromise – the compromise between file size, battery life and video quality. And that starts with the video resolution of your content. If you've ripped a Blu-ray movie with 1,920 x 1,080-pixel (1080p) resolution, it'll look

Step-by-step

Ripping DVD discs with DVD Decrypter.



1 DOWNLOAD AND INSTALL
Search for, download and install DVD Decrypter from www.videohelp.com.



2 SELECT A MODE
Load the disc into your PC's optical drive and launch the app. From the main menu, select Mode and choose IFO. Back to the menu, now select Tools/Settings, select the IFO Mode tab on the Settings window and under Options, change the 'File Splitting' entry to read None. Press the OK button when you're done.



Don't have a Blu-ray drive? External USB Blu-ray drives are great for desktops and notebooks.

great on your big-screen TV, but there's little reason to keep all of that resolution to watch on a five-inch screen. By just dropping it back to 1,280 x 720-pixels (720p), you instantly save, at minimum, half the storage (with good compression, a lot more than that) and the device CPU will have half the work to do, increasing your battery life. But importantly, you'll barely notice the drop in resolution on small screens. Essentially, the pixel density at this resolution will make it very difficult to notice the difference between 1080p and 720p on small phone screens. For DVD content with, at best, 720 x 576-pixel resolution, you don't need to

Movie conversion guide

Use this ready reckoner table to choose the optimal settings for your encodes.

Original video resolution	Playback device resolution	Resolution encode option to select:
7,20 x 480	all resolutions	Original
720 x 576	all resolutions	Original
1,280 x 720	800 x 480	480p
1,280 x 720	1,280 x 800	Original
1,280 x 720	1,366 x 768	Original
1,280 x 720	1,920 x 1,080	Original
1,920 x 1,080	800 x 480	480p
1,920 x 1,080	1,280 x 800	720p
1,920 x 1,080	1,366 x 768	720p
1,920 x 1,080	1,920 x 1,080	720p (battery)
1,920 x 1,080	1,920 x 1,080	Original (quality)

change the resolution – just convert it into the right format for your device. And certainly no up-scaling. Ever. It's just a way to waste storage space. But if all of this talk about resolutions sounds a little confusing, use our resolution guide table (above) as a 'ready reckoner' and it'll help you get the best results.

VIDEO COMPRESSION

The Blu-ray movie disc standard

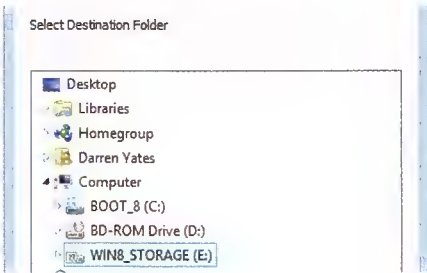
supports a selection of video compression or 'codec' options including VC-1 and H.264 whereas DVDs are encoded exclusively using MPEG-2 compression. Network media players won't have a problem with any of these and many software media players like the ever-popular MX Player on Android can handle them too. But portable devices play some of these formats through software decoding, an inefficient method that requires the device CPU to do all the work. But choose the right codec option and your device can make use of its far-more efficient video codec processor that does the same job with much less power, giving you greater battery life. The best option for this is to re-encode your movies using H.264 compression for two reasons – first, it's playable on virtually every tablet and smartphone going around, but second, these devices all have dedicated H.264 decoding

Movie ripping – is it legal?

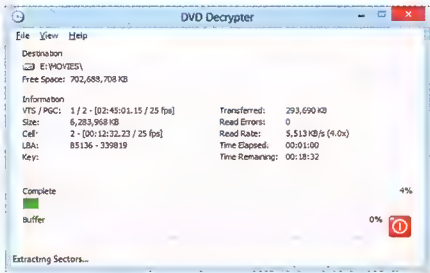
Strictly speaking, ripping content or 'format shifting' is legal in Australia for music, but not movies, except in rare circumstances such as for research. Unfortunately, Australian laws allow format shifting of TV shows and movies on video tape, but not DVD or Blu-ray discs. That said, the reality is that provided you rip your own legally purchased media and keep those rips to yourself, the chances of running into any legal issues are remote.



1 FIND THE FILE Back on the main screen, you'll see the disc information on the right side. In the Input tab, select the PGC option with the longest runtime next to it.



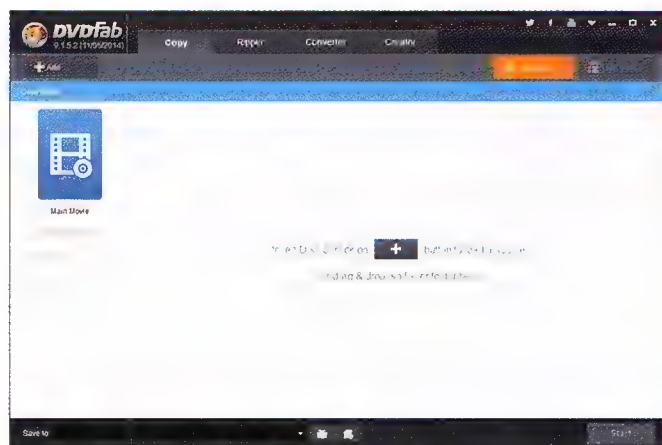
2 SAVE LOCATION On the left side of the main screen, click on the folder icon to the right of the Destination panel and choose a save location.



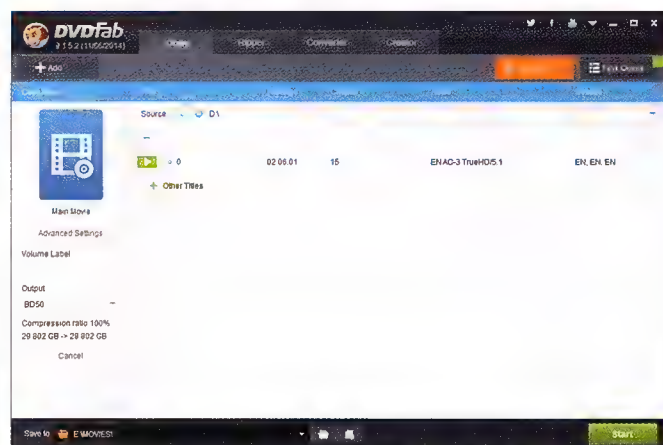
3 RIP THE FILE When you're ready, press the DVD green arrow icon underneath and the disc will start ripping. At the end, you should find a single VTS_0x_1.VOB file containing your movie at your desired location.

Step-by-step

Rip Blu-ray discs with DVDFab HD Decrypter.



1 DOWNLOAD THE PROGRAM
Search for DVDFab HD Decrypter online, download it and install it. Launch the app, click the 'try' button on the lower-left of the screen when you see the DVDFab purchase screen. When the main app screen appears, load in your Blu-ray disc.



2 CHOOSE THE SAVE LOCATION
Once the app has created the correct settings for itself, use the 'Save to' combo box on the bottom left to choose a save location (remember, Blu-ray discs can hold up to 50GB so make sure you have plenty of storage available).

hardware to free up the main CPU and extend that battery life.

USING APC SIMPLE VIDEO CONVERTER 3

Readers of our former sister publication PC User may remember I wrote a number of video encoding apps to make the job of video conversion easier. For this article, I've put together the new APC Simple Video Converter 3 – and it's about as simple as a video converter can get. It's completely open-source (you can even edit it yourself) and integrates into Windows Explorer. It supports batch encoding and you can even join a folder worth of VOB or TS files together and encode to a single file. It relies on another open-source tool, the FFmpeg audio/video command-line transcoder.

HOW IT WORKS

The Simple Video Converter is really not much more than a complex Windows Registry key you install into your Windows system. But before you break out into a security panic, feel free to see what the registry key does – you can view it (and edit it) in Windows Notepad. You can also uninstall it by simply launching the uninstaller key – you can view that in Notepad too. The install registry key integrates new entries into Windows Explorer's right-click context menu tool – just right-click on a media file, select the option you want and the file conversion will begin.

There's no need to worry about filenames – our Simple Video Converter automatically uses the original filename and appends 'SVC3.mp4' to the end of the file, ensuring you

can never overwrite your original file (unless you modify the Registry key to do so).

ONE VS TWO-PASS CONVERSION

Our Simple Video Converter provides both one and two-pass conversion methods – the difference is that the two-pass encoding gives you a better quality for the same file size; the downside is that it takes near-on twice as long to do the job because it has to

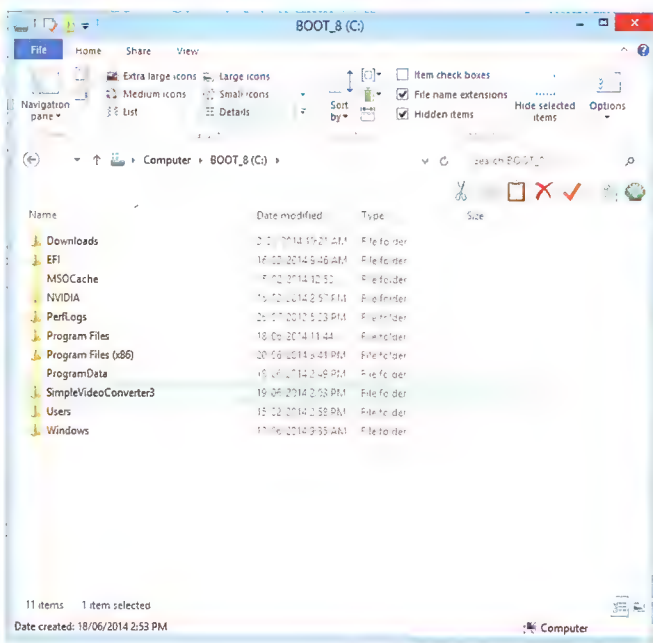
pass over your file twice – once to gather encoding information and the second time to do the actual conversion. Compared with fast low-bit rate single-pass conversions, the two-pass option is usually worth the effort and the best way to maintain video quality with minimum file size.

HOW FAST IS IT?

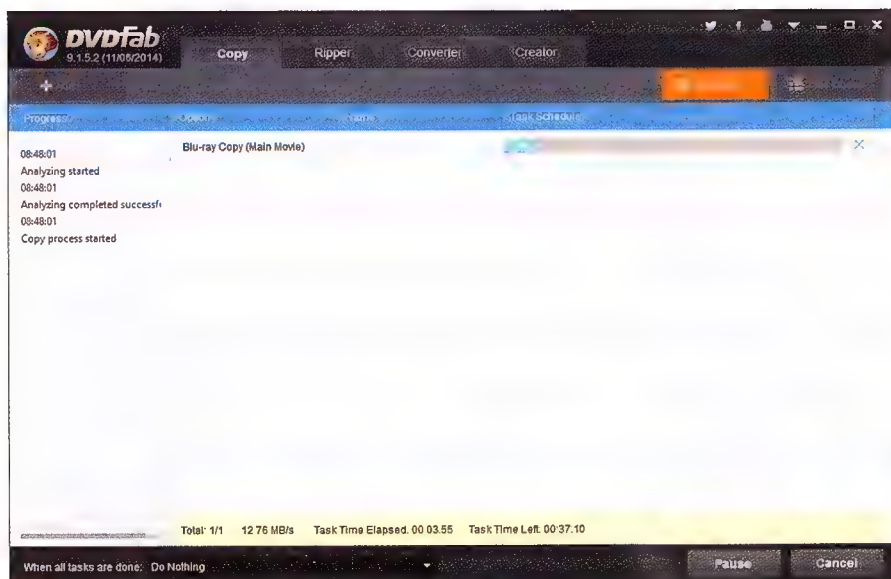
Using an old 3.1GHz Sandy Bridge-grade Core i5 2300 quad core processor, we

Step-by-step

Convert with APC's Simple Video Converter 3.



1 INSTALL THE SOFTWARE
Download APC Simple Video Converter 3 from our web site at www.apcmag.com/magstuff. Unzip it to the root of your C: drive (it should create a folder called 'C:\simplevideoconverter3') and double-click on the InstallConverter.reg registry key. Select OK to any warning prompts.



3 RIP THE BLU-RAY DISC

When you're ready, hit the green Start button and the disc will rip. When it's done, you'll find the .m2ts video file that is your movie in the /BDMV/STREAM subfolder of your chosen location.

saw encoding rates of over 500fps — that means a two-hour DVD movie conversion on a single-pass in under ten minutes. Obviously, 1080p Blu-ray content will take longer to convert, as will doing this with a slower processor or changing resolution, so your mileage may vary.

WHICH OPTION SHOULD I CHOOSE?

You might be overwhelmed by the number of options our right-click context menu provides so if you're not sure where to start, try the single-pass basic-quality option and see what the result looks like. Again, your mileage will vary, depending on the quality of

your original content and the device you play it back on. If you don't like the result, try one of the higher quality options or use one of the two-pass methods. Video conversion is really a mix and match type of job — there are no hard-and-fast rules, just what works and what doesn't. Fundamental laws of compression such as larger frame rates needing more data still apply, but because every video file is different, some encoding methods may suit more than others.

Only one thing is certain — two-pass encoding will always give you the best possible result.

PUTTING TOGETHER YOUR LIBRARY

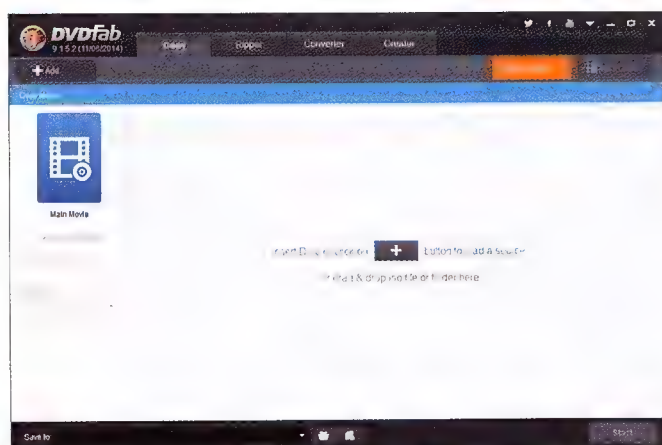
Once you have all of your rips, how you bundle them into your library is up to you. The key thing is that your content is available on your home network so you can access them from your various playback devices. Depending on the size of your library, having sufficient hard drive storage may be the key factor — but don't think you need massive amounts of CPU performance to deliver it. I've used a cheap \$70 Android 4.0-powered single-core 7-inch tablet connected to a 500GB hard drive as a wireless media server; I've also used a \$40 single-core Android 4.0-powered mini PC for the same thing.

If you're using a wireless network, you shouldn't have trouble even with older 802.11g gear — the speed here will still be enough to handle several streaming requests (at least two encoded HD movies or four or five DVD movies) all at the same time.

Clever solutions that convert your videos into different formats 'on the fly' are great, but they require considerable processing horsepower to work well, particularly if you have multiple movies to stream at the same time. By pre-transcoding them once the first time with our Simple Video Converter, the files are ready to go — all you need is basic file-server level performance and even an old single-core netbook or Android tablet can deliver that.

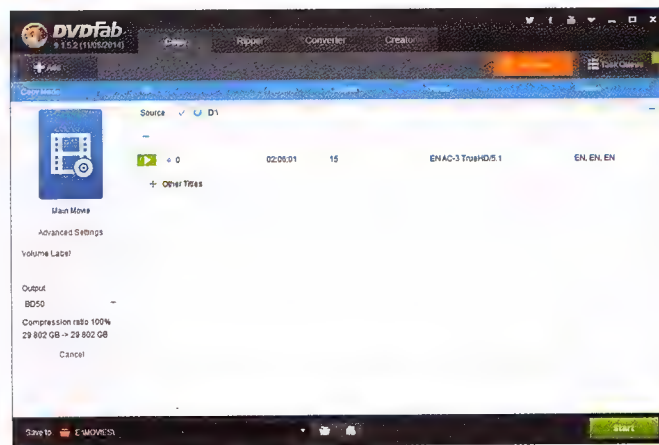
GIVE IT A GO

Legalities over disc ripping notwithstanding, if you have your movie/TV library in physical media, it won't take much to rip them into formats you can play on all of your playback devices — in fact, it can be as simple as rip and right-click. ■



2 CHOOSE WHAT TO ENCODE

Locate a file you want converted, right-click on it, select APC Simple Video Converter 3 and the encoding option you want to use. (You can encode multiple files at the same time by selecting them all with your mouse and right-clicking. You can also concatenate and encode a whole folder by right-clicking on a folder and choosing your option).



3 ENCODE IT!

The encoding command will automatically launch a DOS prompt that runs the Ffmpeg video converter with all the right parameters. Once the file conversion is complete, the DOS prompt will automatically close. The encoded file will appear in the same folder as the original, but with '-SVC3.mp4' on the end of the filename.

Effortless TV downloads

Nathan Taylor explains how to set up and automate TV downloads.

Quite a few of us have become accustomed to downloading TV and video through BitTorrent. It's relatively easy and painless — as long as you know where to get the torrents in the first place, and as long as there are still seeders available who are willing to upload the video, which can be a problem with older content. But what you may not know is that there's an even easier way to get it done: Sick Beard.

Before most shows are put on BitTorrent, they are uploaded to Usenet. Yep, that archaic internet news feed is still alive and well, and it's still widely used for sharing files. It used to be the case that downloading stuff off Usenet was an exercise in sadism, a painful process of search and extraction that required far more patience than most of us will ever possess in ten lifetimes.

Sick Beard changes that. It's absolutely the easiest way to grab TV shows off the internet. It automates the

entire process for you. Just tell it what TV show you want, what episodes (or even seasons) and it will go out and grab them for you, just like that.

There is a little bit of a setup process to go through, however. You'll need a Usenet news account and a newsgroup binary downloader to begin with. So we'll walk you through step by step on getting Sick Beard up and running.

1 CREATE A NEWSGROUP ACCOUNT

Before you do anything, you'll need a newsgroup provider. Technically many ISPs still run newsfeeds, but they very rarely run full feeds, which effectively means that they don't support binaries. And it's the binaries that we want.

Choosing a newsgroup provider

Before you go offering up a subscription fee to the first premium newsgroup provider that a Google search lands you on, you might want to investigate your options a little. Most providers charge about the same for their service, but there are some differentiating factors, such as:

- The amount of data you can download per month
- The speed at which you can download
- Privacy policies
- Data retention (that is, how far back their feed goes, which can go up to 2150 days)
- Number of simultaneous connections to multiple downloads.

With those factors in mind, we've listed some of our favourite news services below.

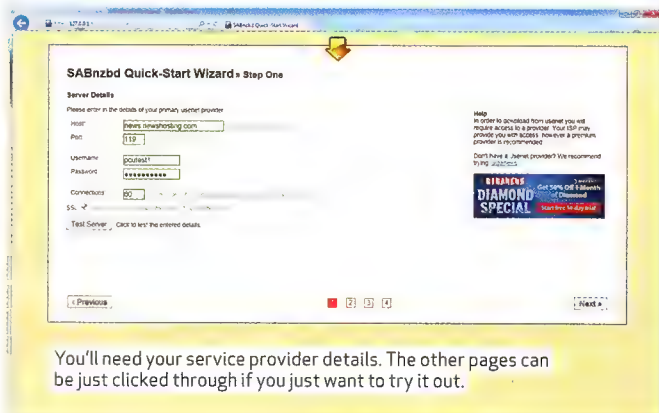
AstraWeb (astraweb.com). AstraWeb is a good choice if you're looking for a simple "all-you-can-eat" plan. Starting at US\$10 per month for unlimited downloads and 20 connections at

10Mbps, or 25GB at unlimited speed with 50 connections. 2139 day retention.

Giganews (www.giganews.com). US\$5 per month for a starter 5GB account up to US\$20 per month for unlimited downloads. There's a 14-day trial period on accounts if you'd just like to see how it all works.

Newshosting (www.newshosting.com). With a 14-day free trial, Newshosting is another good bet if you just want to see what this whole Usenet thing is about. Its plans start at US\$10 per month for 50GB (with rollover) and go up to US\$20 for all you can eat with 60 simultaneous connections. It has 2140 day retention.

Usenetserver (www.usenetserver.com). Usenetserver offers a nice, straightforward package: US\$10 per month for unlimited speed and volume. It has 2140 days data retention and offers 20 concurrent connections.



You'll need your service provider details. The other pages can be just clicked through if you just want to try it out.

To get a full feed, you'll generally have to subscribe to a premium news service. Most such services have a relatively modest subscription fee — typically US\$10 a month. The box breakout below has some options, but there are many more premium newsgroup providers available.

Once you've chosen one and subscribed to the service, you'll just need to get the news server details from the service provider's web site. You'll need the host address, the port number and the number of connections supported.

2 INSTALL SABNZBD

Next up, we need to get a Usenet binary downloader up and running. Technically, Sick Beard will work with any binary downloader, but it's specially designed to work with SABnzbd.

For those that aren't familiar with the concept, a binary downloader simplifies the process of grabbing files off Usenet. Usenet wasn't designed for sharing files, so binary files are actually attached to posts as long strings of text. The binary downloader takes that text and turns it into something usable.

Head to **SABnzbd.org** and download SABnzbd for your platform, then run it. It will open up a browser window and the wizard will walk you through the setup process.

SABnzbd runs windowless as a taskbar icon, so once you've set it up, you don't need to worry about it too much. It's managed through a browser window, typically at <http://127.0.0.1:8080/SABnzbd/>, and

you can access it and stop it by right clicking on the icon. You don't need to keep the browser window open for it to work.

Once it's running, you don't actually need to use SABnzbd or do anything with it except get the API key (more on that in a second). Sick Beard will use it for you.

3 INSTALL AND RUN SICK BEARD

Head to code.google.com/p/sickbeard/ and download Sick Beard for your chosen platform.

Run the executable file and Sick Beard will pop up in your browser. Like SABnzbd, it works entirely in a browser window. You don't need to keep the browser window open while it runs.

4 GET SICK BEARD TO TALK TO SABNZBD

We now need to configure Sick Beard to use our Usenet downloader. In Sick Beard, click on 'Config > Search Settings'. Under the NZB Search section, we need to enter our SABnzbd details.

- Set the NZB method to SABnzbd.
 - The SABnzbd URL (unless you've manually changed it) is <http://127.0.0.1:8080/>
 - If you added a username and password for SABnzbd you need to enter it here.
 - You need to jump over to SABnzbd to find the API key. Use the taskbar icon to launch SABnzbd (it should open a new tab in your browser). In SABnzbd, click on Config in the top left, then General. Copy and paste the string of text next to API key from SABnzbd over to the field in Sick Beard.
- In Sick Beard, click on Test SABnzbd to make sure that everything is working properly. If it is, click on 'Save Changes'.

That's it for the hard part! Now we just have to pick our shows and let Sick Beard do its thing.

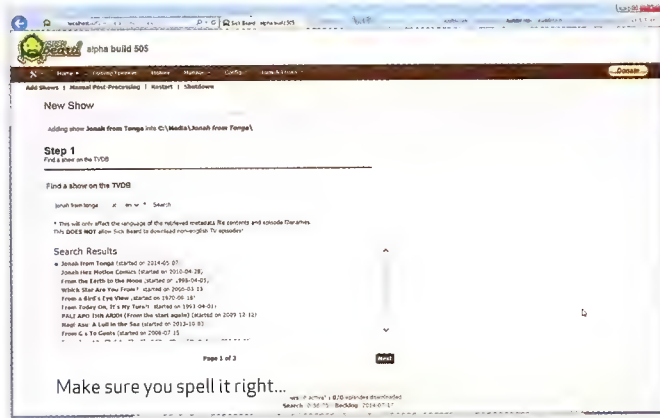
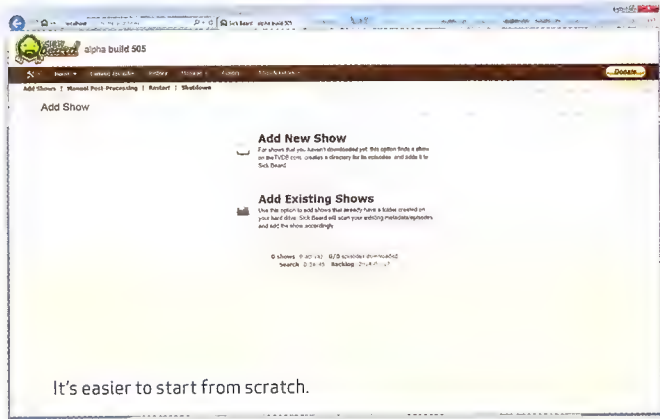
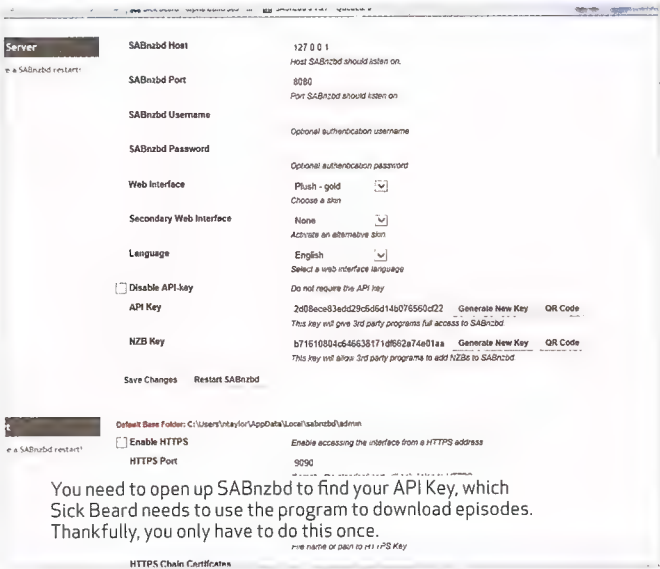
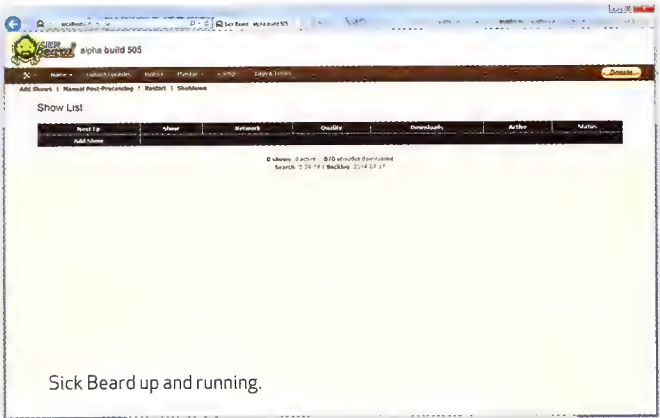
5 ADD SHOWS

In Sick Beard, click on the Add Shows button. You'll get an option to add a new show to your download list or add episodes of an existing show for which you already have episodes and a folder. Click on Add New Show.

Next, type in the name of the show you want, then click on the Search button. A list of matching shows will appear. Pick the one that seems right then click Next.

6 CHOOSE A DIRECTORY

Enter the parent folder for the show. This is the base directory where the show will be saved to. Sick Beard will automatically create subdirectories for the show and its seasons. So if you set the folder to C:\TVshows, for example, Sick Beard will create a folder there



specifically for this show, and directories under that sorting episodes by season.

Click on the New button and a folder browser window will pop up. Choose your directory from there. (In the future for other shows, this directory will automatically appear in your list of options). Click Next.

7 CUSTOMISE YOUR DOWNLOAD OPTIONS

The third Add Show stage, customize options, is where you set whether you want to just download future episodes of the show, or get the entire archive, what quality you want and whether to use subdirectories.

Next to 'Set the initial status of missing episodes' you have four options. Three of them: Skipped, Ignored, Archived essentially mean "don't download the show right now – I have stuff to sort out first". Wanted means it will download the show immediately. If you want to kick off the downloads immediately, choose Wanted. If you'd like to get things all set up first, choose Skipped. We'll assume you choose Skipped – you can always change that later, once you've got an episode list up and running.

The flatten tick box simply chooses whether to put all the episodes into a single directory or to create season subdirectories.

Then we come to quality. You have six options. Custom is a special case, used for archived files, where you might have a copy of the file already but want to download a better quality version if it becomes available. Any just grabs the first copy of the episode it finds.

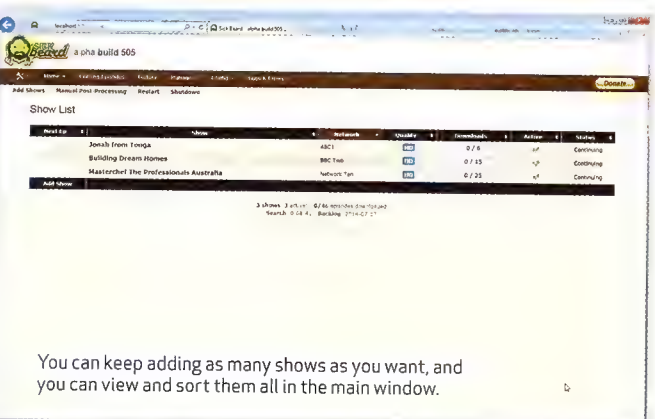
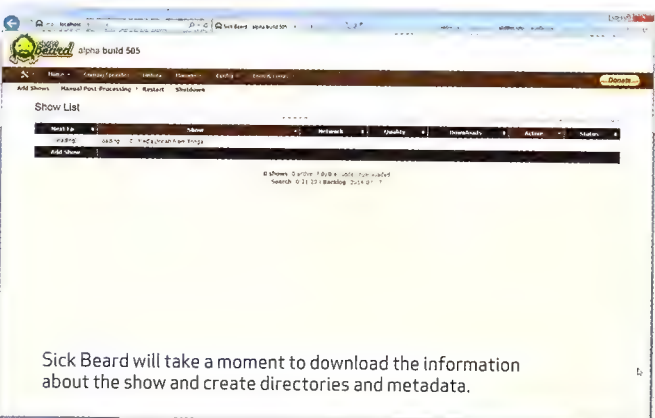
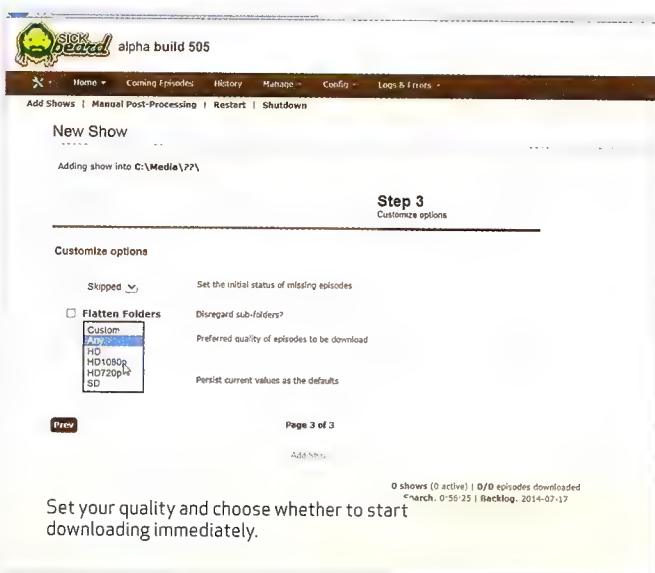
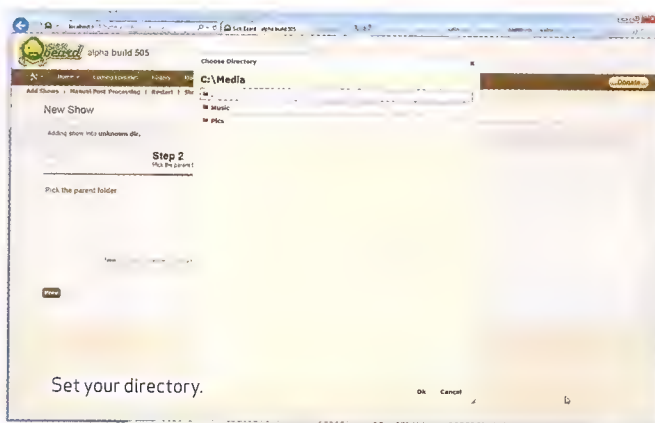
The four quality settings are pretty straightforward. HD1080p is the best, followed by HD720p, then SD. HD simply grabs the first HD quality version it can find (either 720p or 1080p). The quality will, of course, affect the size of the download. A 40-minute episode in SD will run 200-350MB; in HD720 it will likely be in the 1-1.3GB range.

You can also have Sick Beard set these as your default option for future adds. When you're ready click Add Show.

8 VIEW YOUR SHOW LIST

After you've added a show, Sick Beard will take you back to the main page. There will likely be a minute or two in which it downloads the metadata about that show.

Once it's done, the show you've added will appear in the list on your main Sick Beard window. Any other shows you've added will also appear in the list. The list can be sorted by show name, by the network it appears on, by its quality or its status as a finished or ongoing show. Just click on the column label to perform a sort.



9 MANAGE AN INDIVIDUAL SHOW

Unless you selected Wanted during the add show process, Sick Beard will not automatically download the show's episodes for you. All episodes will be marked as Skipped. But now you'd like to download all or some of the episodes.

Click on the name of the show. This will bring up the complete episode list for that show, and the status of the episode in your archive.

Click on the check boxes next to the episodes you want downloaded, or on the top left check box if you just want to grab all episodes. Then click on the Go button next to 'Change selected episodes to Wanted'.

If you want to change the search parameters (for instance, if you decide you want HD versions when you initially selected SD), you can change them here by clicking on Edit.

After you've done that, click on the Home button.

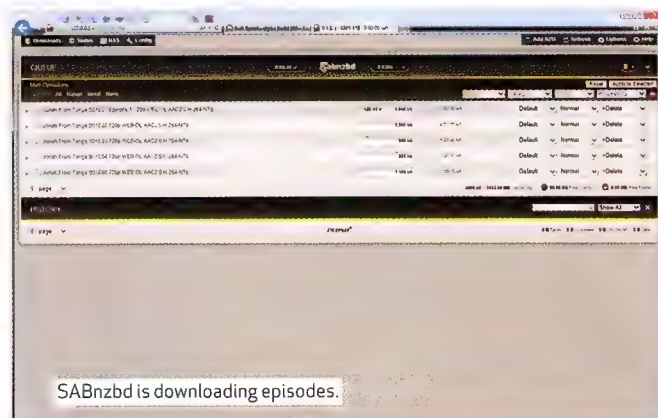
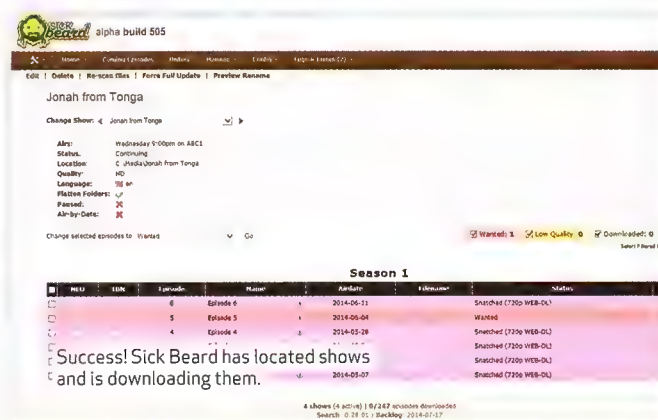
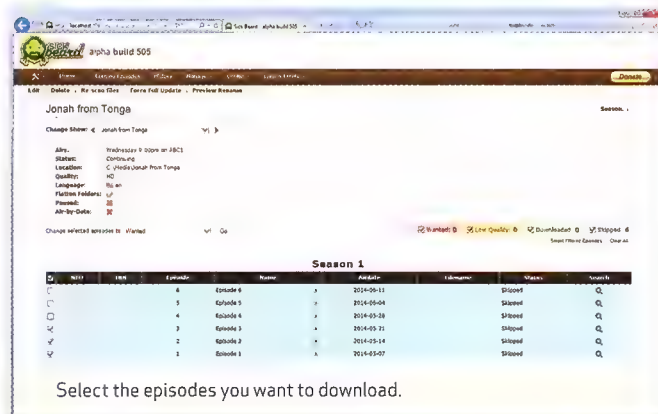
10 LET SICK BEARD AND SABNZBD DO THEIR THING

Once you have shows on your wanted list, Sick Beard and SABnzbd will do the rest. Sick Beard will find the show on Usenet, then ask SABnzbd to download it.

If you look at the show in Sick Beard, you'll see its status has been updated to Snatched.

While if you fire up SABnzbd, you can see the status of the downloads.

When the download is complete, it should appear right in the directory you specified, and its status in Sick Beard will change to Downloaded. That's it, you're all set. Future episodes will automatically appear in Sick Beard as they are broadcast, which makes it very easy to get all the episodes as soon as they appear online. Enjoy your viewing!



The web sites you need

- To download Sick Beard: code.google.com/p/sickbeard/
- Sick Beard management: localhost:8081/home/
- To download SABnzbd: SABnzbd.org
- SABnzbd administration: 127.0.0.1:8080/SABnzbd/

Premium newsgroup providers:

- AstraWeb astraweb.com
- Giganews www.giganews.com
- Newshosting www.newshosting.com
- Usenetserver www.usenetserver.com

Adding existing shows

We didn't talk about option two here, but it can be useful if you've already got an archive of television show episodes but you'd like to use Sick Beard to download future episodes of that show.

To use it, click on Add Existing Show, then in the directory selection screen point it at your TV directory (eg. C:\

TVshows). From there, you can check the box with the individual show directory and set the download options as usual. Sick Beard actually does a very good job of figuring out episodes, so it should add existing episodes automatically, with their status set to Downloaded. ■



Yes, even a NAS box can look attractive.

Titanic NAS boxes

Get ample space for all your media with these five-bay NAS devices. Dan Gardiner tests six of the latest.

If you want to create the ultimate hub for storing all your movies, TV and music, then a NAS box is the best way to go. They can offer an always-on, redundant home that will keep your precious files safe and sound. And the best news is that they're not as hard to use as they used to be. NAS devices have come a long way in the last half a decade – and they've actually learned a lot from the smartphone and tablet revolution. Many of the NAS's here run on Intel Atom processors, making them essentially low-powered PCs that have been turned to storage tasks. Where once they were clunky boxes that you needed dual degrees (in networking and storage) to set up, NASs have become far more user friendly and much faster to get going. Companies like Drobo, for example, have chosen to specialise in making the whole process very simple, with enclosures that have completely tool-less drive installation and software that automates as much of the setup and management processes

as it can. In Drobo's case, that only comes at a very slight cost to functionality – to a degree that won't matter to most users.

It's not just setup and installation that's changed either. The range of features and expandability have both grown drastically, with many NAS vendors putting together custom

operating systems for their boxes, with the likes of QNAP and Synology competing with each other on with desktop-like interfaces that are completely controlled through your web browser. It's a slightly simplified experience that's halfway between using a tablet (or smartphone) and a regular PC – there're even dedicated



LABS BENCHMARK RESULTS

1.12GB movie file copy test

	READING FROM SPEED (MB/S)
DROBO 5N	41.3
LACIE SBIG NAS PRO*	33.8
QNAP TS-569 PRO	70
SYNOLOGY DS-1513+	49.7
THECUS N5550	39.6
D-LINK SHARECENTER PRO 1200	47.3

1.12GB movie file copy test

	WRITING TO SPEED (MB/S)
DROBO 5N	55.7
LACIE SBIG NAS PRO*	63.1
QNAP TS-569 PRO	64.8
SYNOLOGY DS-1513+	61.8
THECUS N5550	57.9
D-LINK SHARECENTER PRO 1200	58.8

3.34GB assorted files backup test

	READING FROM SPEED (MB/S)
DROBO 5N	24.4
LACIE SBIG NAS PRO*	27.4
QNAP TS-569 PRO	28.5
SYNOLOGY DS-1513+	25.7
THECUS N5550	24.7
D-LINK SHARECENTER PRO 1200	20.2

programs that essentially act like an App Store and let you single-click to install a new app and expand the capabilities of your box.

WHICH HARD DRIVES?

The arrival of NAS-specific hard drives should be ample evidence of the rising popularity of these storage boxes, but are they worth paying more for? The general answer to that is yes. Drive manufacturers have introduced these lines to counteract some of the problems they'd started to face in other lines — several years back, Western Digital notoriously stated that its Green drives weren't suitable for RAID and the company has since launched the Red line to try and put the whole problem of which drives to use to bed.

The loads and demands put on NAS hard drives versus regular desktop use can also be quite different, so the error correction methods (and tolerance of different error types) are balanced differently on NAS drives versus those intended for general system storage or as OS disks. (Not that many APC readers would still be using the latter we're assuming, with the price of SSDs now so low that it's reasonable to use them in all your PCs.) It should also be easier to find identical drives in the case you're creating a RAID 0 or 1 array that requires the latter.

If you're shopping for NAS hard drives, the current pricing sweet spot is arguably at 3TB, with models hovering around the \$165 mark online — about 5.5c per gig. 4TB models aren't too far behind however, at around 5.75c per gig (or \$230), so if you need the extra storage you won't be losing out by buying now instead of later.

HOW WE TESTED

To test these NAS devices, we set up a dedicated Gigabit network in APC Labs and connected each NAS to it. We tested the LaCie device using the



Look for dedicated NAS hard drives when you're installing your own.

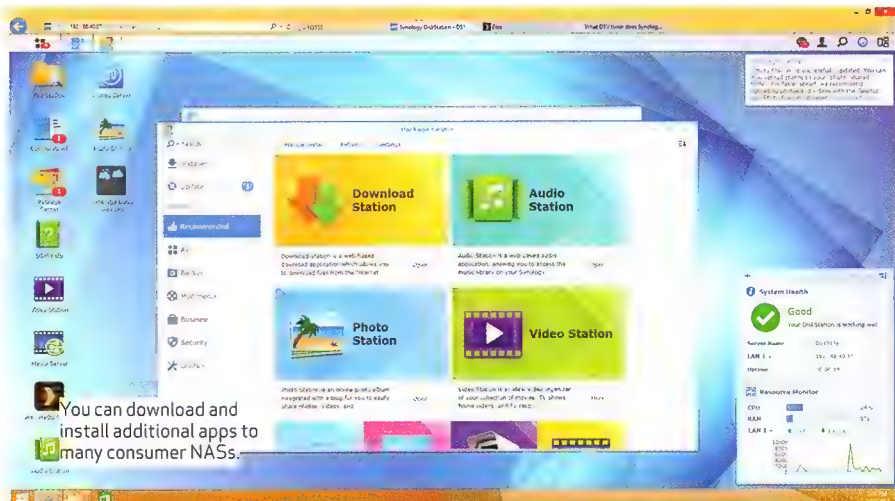
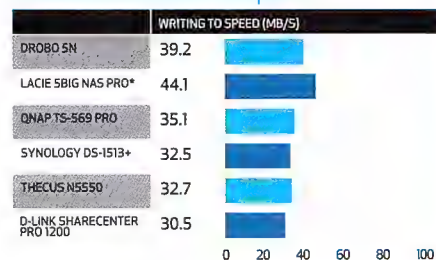
"The range of features and expandability have both grown drastically, with many NAS vendors putting together custom operating systems."

pre-installed drives that it shipped with; for all others we install three 1TB WD Red drives in a RAID 5 setup. To test performance, we conducted four timed transfer tests on each box — two copying data to the NAS (writing) and two copying data back in the other direction (reading).

The individual copy tests used a 1.12GB movie file to test sustained

throughput and a 3.5GB folder of assorted files to test how well each NAS handles backup jobs, which involve more intensive file reading and writing. With many of the models we tested using an Intel Atom processor of some kind, the performance of these units was often very close, as you can see from the included table of results below.

3.34GB assorted files backup test

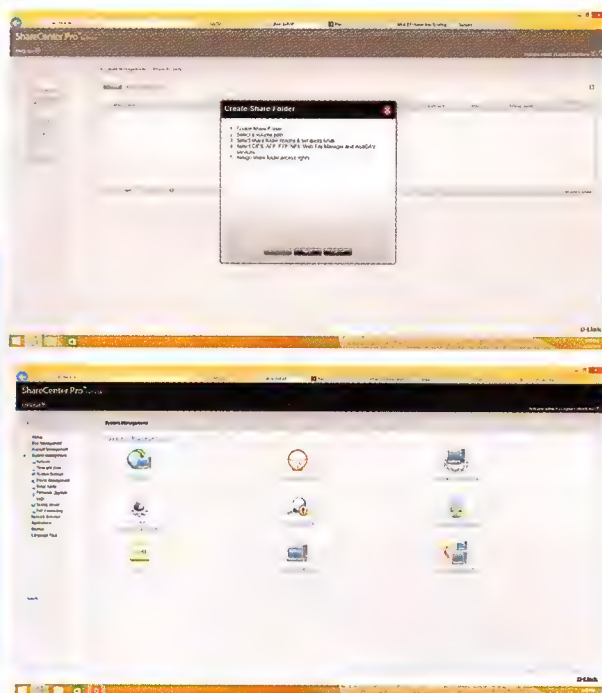


SUPER

It's got a plain interface and is short on features, but this is still a solid backup and sharing box.

NAS

\$460 | WWW.DLINK.COM.AU



D-Link ShareCenter Pro 1200

Sells for a very low price, but is also rather low on features.

Coming in at around \$130 less than its next closest rival – that's enough to buy you an extra 3TB drive to slot inside it – the ShareCenter Pro 1200 is none the less still a very solidly-built NAS. However, this is a product that's clearly more geared towards small and medium businesses than media-centric home users – it's main focus is on providing solid backup credentials, with little in the way of expandability via optional apps and the like. Compared to the more feature-packed offerings from the likes of Synology, QNAP and Thcus, the ShareCenter does come out a little wanting – but then, two of those boxes expect you to pay twice this D-Link's price.

In terms of hardware, there's little to be envious of, however. Around the back of the rather corporate looking chassis are twin Gigabit Ethernet (GigE) and two USB 2.0 ports, and under the

hood is a quad core processor (D-Link doesn't specify what speed or brand unfortunately).

Setting up the 1200 is fairly straightforward and quick, although each drive must first be screwed into a tray before being slotted into a bay on the NAS, and there's a lockable front door that keeps all those bays relatively secure. (These trays also have appropriate sockets to support 2.5-inch drives, should you want to build an SSD-based storage box.) Once the drives are in place, it's just a matter of checking the IP address on the front yellow-and-black OLED screen, logging into the web interface via a browser and then stepping through a short wizard (which automatically pops up) to create your array. With our three 1TB test drives, the whole process took around 10 minutes.

One thing the 1200 doesn't do is create a default shared folder, though it's a simple affair to dive back into the web interface's

home page and use the included wizard to set some up. And the interface in general is very smart looking, if somewhat plain, using a faux folder structure that apes some Windows management tools.

When it comes to advanced features, there's relatively little here for home users – only basic FTP or HTTP downloading (no BitTorrent or Usenet) and no media sharing via DLNA, iTunes or Plex. There's likewise no automatic firmware updating – you'll need to manually go along to D-Link's web site, download the latest firmware and then dig through the web interface to apply it.

For business users there's iSCSI support and the ability to backup to Amazon's S3 cloud service, but these will be of less appeal to most home users.

On the plus side, the ShareCenter is very fast to boot up – shares reappeared on the network in around 30 seconds from hitting the power button. It currently

supports drives up to 4TB, with as yet no indication of whether that'll be expanded to include the 6TB models that have hit the market in the last 6 months or so. Its performance in general was average to low – although as we mentioned earlier, there often wasn't a huge margin of difference between the units we tested this month.

In all, not a bad unit considering the low price, but spend a little more and you'll get something with a much broader range of features available.

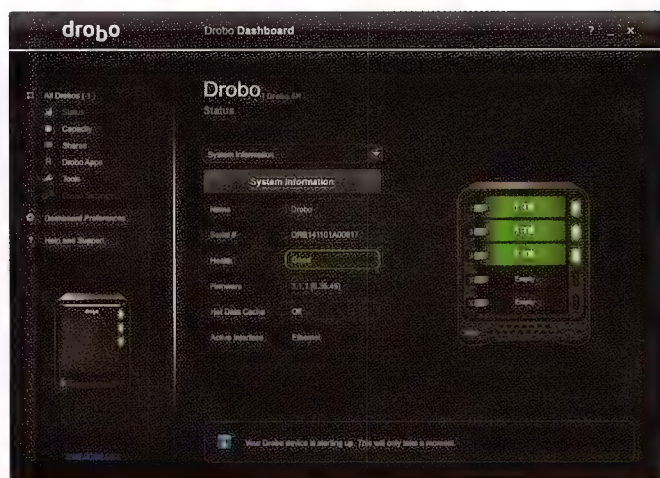
Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

If all you need is backup and sharing basics, this one's decent value.



Drobo admin requires you to install a PC or Mac app, rather than use a web interface.



NAS

\$800 | WWW.DROBO.COM



Drobo 5N

How simple can you make NAS setup and management?

Drobo promotes its range of NAS and USB RAID boxes as providing “the best storage experience ever”, banking on making its gear as easy to use as possible, rather than going overboard with features. That said, the Drobo packs a lot more in than the preceding D-Link – you can install a handful of third-party apps, with many geared towards downloading and media management, including the likes of Plex, Sick Beard (and its movie- and music-downloading equivalents CouchPotato and Headphones), plus Usenet and BitTorrent clients in the form of SABnzbd and transmission, respectively. That should be enough to keep even moderately-demanding home users well and truly happy.

True to its mantra, setting up the 5N is a very easy task. There's a magnetically-attached front cover that hides the drive bays, which easily pulls off to expose the

spring-loaded slots (each with a protective flap) behind. Push a drive into one of those slots and the protective flap folds down and backwards to accommodate the drive, with an similarly-sprung arm at the side clicking into place to hold the drive firmly. It takes literally five seconds to pull the cover off and another 5 seconds to install each drive – that's about as painless as you'll find for any NAS. Once the drives are in, you just plug it into your network and power, turn it on and then fire up the Drobo app. You heard right: rather than being managed through a web interface like all the others here, Drobo provides a dedicated client program (with versions for Windows and Mac) for NAS management. When you load it for the first time, it'll initialise all your drives, creating a RAID 5 array without any user input whatsoever.

The management app generally works well,

though some areas weren't as responsive as we'd like – it takes a good 30 seconds for the Apps page to load, for example.

Drobo uses a proprietary software RAID technology (called BeyondRAID) which effectively lets you mix any configuration of drives to create a RAID 5 set up. You can add extra drives at any time to add more storage – and extra drives are initialised without the unit having to be taken offline. That said, the vagaries of this special mode mean that you won't always expand the capacity by the size of the drive you add. For example, if you've got three 1TB drives in place and you add a 2TB, you'll only get an extra 1TB of space.

Hardware extras are a little mixed: while there're no USB ports for quickly transferring data on and off (or expanding on the internal drives) there are some unique extras such as a built-in backup battery – which has enough juice to write data in memory and

drive caches should your power fail – and an mSATA socket for upgrading the system storage and therefore enhancing performance. There's no 6TB support yet – it was still in the testing phase at the time of print.

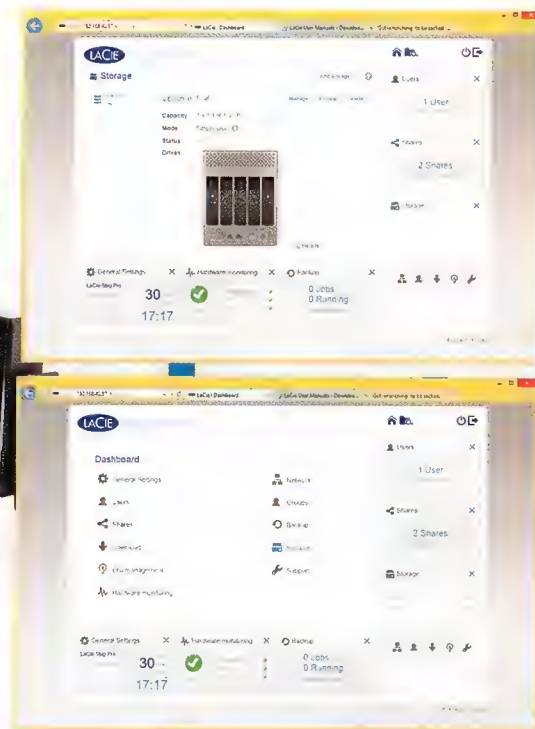
While it's not quite as full featured as some of the others here, if you value a clean and simple approach the Drobo 5N is a great no-fuss option that's definitely worth considering.

Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

Exceptionally easy to use with a decent range of apps, but not quite as feature-filled as some others.





NAS

\$600 | WWW.LACIE.COM/AU

Though it's not as full-featured as some, the 5big has clean and attractive design from end to end.

LaCie 5big NAS Pro

Stylish storage at a reasonable price.

LaCie's 5big NAS Pro is available both with and without drives – we were sent a 10TB unit (populated with five 2TB drives) for testing, but you can also find it pre-installed with 6TB drives for a whopping 30TB array. (It'll set you back around \$2,700.) LaCie actually offers two distinct five-bay NAS devices – this one's the more pricey model, but also the most up-to-date in terms of OS – it's running LaCie's NAS OS3. And on the price front, in this crowd, that \$600 price tag is actually very reasonable.

From the front, this is undeniably one of the slickest-looking NAS boxes you'll find – its solid aluminium chassis and glowing blue power button make it look a bit like a benevolent version of HAL from Stanley Kubrick's *2001*. The drive bays are all hidden in the back, though thankfully they're still relatively easy to get at and

swap drives in and out of. There's a good range of expandability via ports there too, with four USB sockets (two each of 2.0 and 3.0), two GigE ports and a VGA output for optionally monitoring the status of the device. Physically, it's quite compact in size, but some of that is due to its use of an external power brick.

Like the D-Link ShareCenter, this is a NAS that's aimed more at business use than the home, although there are a few concessions made for the latter users. That includes a built-in download client that can handle HTTP, FTP and BitTorrent links and the 5big Pro can also share onboard media via built-in DLNA and iTunes servers. It can do cloud backup too, though only via LaCie's own Wuala backup service – which is a paid option only unfortunately.

Setup is reasonably simple – you'll need to screw each drive into a

bracket, then slide it into the back before turning a dial (using a flathead screw driver or a 5c piece) to lock it into place. Initial drive set up is done through the web interface and, after clicking on the Storage widget, you're prompted to create an array using LaCie's SimplyRAID tech. Like Drobo's BeyondRAID, this allows you to use different capacity drives in a RAID 5 array and easily add more storage as you go along, expanding the volume until you've filled the available bays. (Like most the others here, you can also set it up for RAID 0, 1, 5, 5+spare, 6 and 6+spare, if desired.)

Like the chassis, the web interface is reasonably slick, with quick access to all the main functions from one page, plus little widgets to display the status of different areas – hardware monitoring, the number of shares and any backup jobs that are

running. There's even some customisability to the latter, with the capacity to drag them around to different positions in the interface.

In terms of flaws, the 5big NAS Pro has relatively few. We wish the power plug was a little more secure – it uses a small circular plug with multiple pins, but this doesn't lock as firmly in place as the kettle-cord's seen in most others here. This one isn't quite as full-featured as the best here, but it still offers a pleasing mix of price and performance.

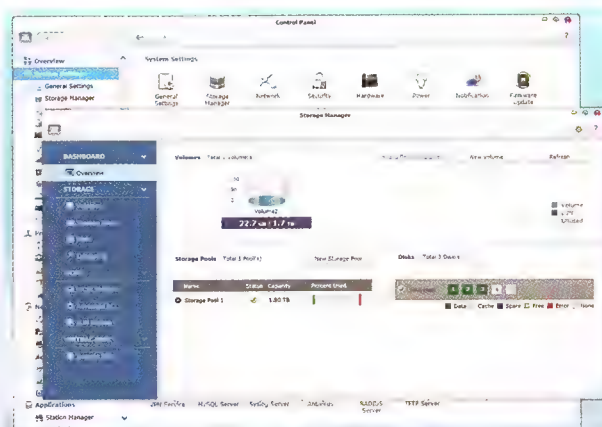
Verdict

Features
Performance
Value

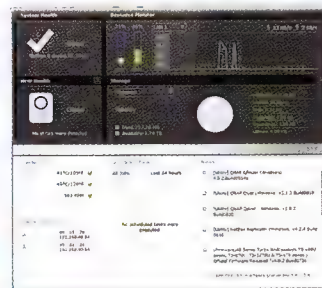


Comparatively light on features, but at least the price is right.





QNAP features a huge range of apps and a desktop-like interface.



NAS

\$1,050 | WWW.QNAP.COM

QNAP TS-569 Pro

Stacked with features, can this one live up to its high asking price?

QNAP's one of the three big Taiwanese names in NAS boxes, alongside Synology and Thecus. Between the three of them, they've developed some of the most cutting edge interfaces and helped spearhead the move towards offering apps for NASs, which have greatly expanded what a modern NAS can do. And that shows in the TS-569 Pro, which is about as feature-packed as they come.

Alongside the five drive bays in the front, there's a mass of extra sockets around back — four USB 2.0, two USB 3.0, two eSATA, two GigE ports, as well as a front-facing USB 2.0 with Copy button (which can be set up to transfer to or from the drive) plus HDMI for connecting a monitor. Under the hood is an 2.13GHz Atom processor and 1GB of RAM.

Initial drive installation

on the TS-569 isn't tool-less — so you'll need to screw each drive into a tray with four screws before insertion back into chassis — but you can securely lock drives in place via an included set of security keys. Power the unit up and the blue LED display up top tells you exactly what the unit is doing — such as booting, loading drivers and, when it's finished, the unit's IP address — and you can even do the initial RAID volume set up via this display and two buttons (Enter/Select) to its right.

Really, it's the software that makes the TS-569 Pro shine, though. Running a custom Linux-based OS called QTS 4.0, you interact with the NAS in a browser window in a sort of simulated desktop environment. This includes shortcuts to applications that, when run, open in windows that can be dragged around and rearranged. It's fast

and slick, and essentially just like running a native OS, except that it's all done via Java in your web browser. And in QTS there's an absolute heap of apps you can download and install, which can drastically expand what the TS-569 Pro can do. All the basics are catered for out of the box (such as iTunes and DLNA servers), but on top of that you'll find downloaders for BitTorrent, Usenet and the web in general, free and paid antivirus scanners (the former based on clamav.net, the latter on McAfee) to keep watch on the contents of your NAS, plus Qsync a Dropbox-like feature that syncs selected files and folders to different computers, with clients for iOS and Android that let you access any 'Qsynced' files. There's support for automated cloud backup to services like Amazon S3 and ElephantDrive, so you can backup selected folders to these online

providers. It can even eliminate the need for a PC in some instances — you can, for example, search for torrents directly in the BitTorrent app. You can install XBMC on it and use it as your main TV media player, thanks to the HDMI output in the back.

In short, there's so much expandability here that you can, in a sense, see why QNAP is asking so much for this box. You'll need to decide whether you can use it all — and therefore if that price is worth it.

Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

Overflowing with features, with a simple management interface — but all that'll cost you.





NAS

\$950 | WWW.SYNOLOGY.COM

NAS administration is easy thanks to a faux desktop environment.

Synology DS1513+

Offers easy drive installation and heaps of expandability — both for software and hardware.

The DS1513+ is a unit that we've reviewed before in APC — last time, we lauded its huge range of features, but said they might ultimately be overkill for many users. That assessment still rings true, and in many ways this box is very similar to QNAP's TS-569 Pro, right down to having a 2.13GHz Atom processor and using a Linux-based OS that simulates a desktop environment in your web browser.

Also like the QNAP, it's absolutely stacked with expansion ports in the back — four USB 2.0, two eSATA and two USB 3.0 sockets let you plug in up to an additional eight devices. Those USB 3.0 ports will be particularly handy if you want to get stuff on or off the DS1513+ quickly — though we do wish that, like the QNAP, there was at least one USB port positioned on the front for easier access. (C'est la vie!)

The default storage option is Synology's Hybrid RAID — as on many others here, this is a software-based RAID 5 set up that lets you mix and match drives of different capacities (though with some drawbacks) to build a storage volume that can be expanded as needed. It's certified to support drives up to 6TB, too, so you could conceivably create a 30TB monster array with this one. Those four Gigabit Ethernet ports in back also support link aggregation — meaning they can effectively act as a single port, allowing the unit to more easily handle data when there are multiple clients going at it. (Of course, no individual device is going to be able to read or write at those speeds unless it's using link aggregation too.)

One thing the Synology does have over the QNAP is that drive installation is tool-less. Just flip up the

cover on the front of each bay and slide a drive in, then click the cover back in place and — optionally — use the included key to lock the cover down.

"But what about the apps!?" we hear you yelling. There's a bucketload included and more you can download and add as you go. There's the same BitTorrent downloading and searching capabilities here as on the QNAP, cloud sync with Google Drive and Dropbox, free and commercial antivirus, Amazon Glacier cloud backup, Plex Media Server built-in and even the ability to run a web server with the likes of Dropbox, Drupal, Joomla. It can also transcode video files (up to 720p) to stream to your mobile devices. In short, it's not really wanting in any regard from a software perspective, though it's disappointing there's no LED display on the DS1513+ (especially considering the price).

Overflowing with features, the DS1513+ has more than enough on board to satisfy just about any NAS user. That all this power and expandability comes at a price shouldn't really be that surprising, but it is at least a little less dear than QNAP's equivalent offering.

Verdict

Features
Performance
Value

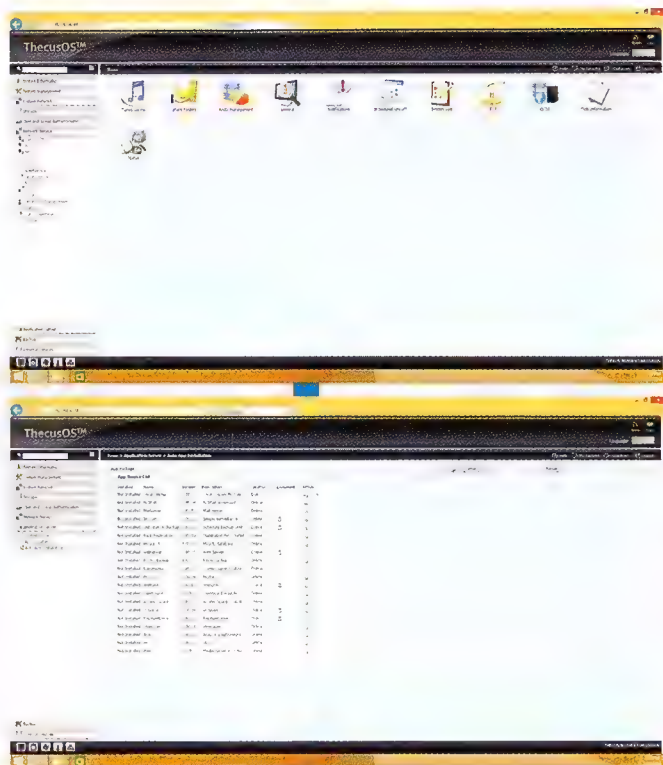


Very similar to the QNAP TS-569 Pro; a little less pricey, but lacks the HDMI port.





✓✓✓
apc
RECOMMENDS



NAS
\$590 | WWW.THECUS.COM

Thecus's NAS OS isn't quite as advanced as some others.

Thecus N5550

A full featured NAS at half the price? What's the catch?

Thecus is the third big NAS vendor in Taiwan, and while its OS isn't quite as slick as those of its two siblings (Synology and QNAP) it almost as full-featured. Arguably more so, in fact, because where the latter two companies often only provide one app for a task, with Thecus you can sometimes pick from two, three or four alternatives. This is a great one for serial downloaders and media aficionados, with multiple app choices for Usenet, BitTorrent, media serving and playback and even download automation via Sick Beard or Couch Potato. There's CrashPlan, Dropbox, OwnCloud, TrueCrypt and MySQL programs. We could go on, but we won't — to make a long story short, Thecus has a good variety of apps that stand up well to those offered by others.

As we've hinted at though, what you don't get with the Thecus is quite as user-friendly and sleek an experience. And it's not that you need to screw the drives into trays before installing them — that's something most of the others here ask, and doesn't take more than 5 minutes to complete. No, what makes it a little harder to use is that you've got to have a bit of networking know-how to just get it going. For example, on first boot the Thecus didn't use DHCP to get an IP on our local network, which meant we had to trundle off to the Thecus site to download a configuration app before we could even access the web interface. And when you do get to the RAID setup, it takes a long time to build; for our three 1TB drives, it took around 3 hours to complete. While there is a 'Quick RAID' option, this isn't enabled by default and also requires the

drives to either be new or wiped before setup. And to install many of the optional apps, you'll need to head off to Thecus's web site and manually download the required packages there; only a handful offer 'click-to-install' functionality direct through the N5550's web interface.

Unlike Synology and QNAP, the OS here (dubbed ThecusOS) doesn't try to emulate a PC's desktop — it's a fairly simple web page with categories on the left that spill open to reveal specific pages for different tasks. It's likely to be a little overwhelming to newcomers, although that's eased slightly by a search box above the whole thing that can make finding what you're after a little easier.

When it comes to configuring settings and finding out what different options do, the interface could also use a little work. There's a Help button up the top, which will drop in a sidebar with info about the

current page you're on and its settings. The English translation is a little wanting at times, but it is comprehensible enough to get the job done.

In sum, the Thecus might not exactly be the smoothest ride around, but if you're willing to put up with a little discomfort during setup, then this one offers great value.

Verdict

Features ★★★★★
Performance ★★★★★
Value ★★★★★

It may not get you there in style, but it will (mostly) do the job — and at a keen price.



howto

» QUICK TIPS

Experts solve your computing problems

APC and its readers can be one giant helpdesk. If you have a technical problem, chances are one of us can solve it.

WINDOWS

[COPY FILE LIST TO CLIPBOARD]

In Windows 8, I'm unable to find a useful Registry tweak that copies a list of files inside a selected folder to the clipboard. What's going wrong? Thanks very much for your help!

Roger Rowland

The problem here is a %l special variable that's used in the tweak, which worked in older versions of Windows but isn't recognised in Windows 8. Don't worry, though — you can fix the problem by following this guide to substitute it with %L instead.

1 Launch the Registry Editor. First, press Windows-R to open the Run dialog box, then type `//regedit//` and press Enter, clicking 'Yes' when prompted to open Registry Editor. Now browse to the following key in the left-hand pane: `HKEY_CLASSES_ROOT\Folder\shell`.

2 Next, you need to create the first key by right-clicking the shell folder and choose 'New > Key'. Name it copylist. Now double-click the Default value in the right-hand pane and change it to 'Copy file list to

clipboard' — this will appear in the pop-up menu when you right-click a folder.

3 Now we'll add the command that makes this hack work. Right-click the copylist key and choose 'New > Key' again. Name this new key command. With your new command key selected, double-click the Default value and change it to the following: `cmd /c dir "%L" /b /a:-d /o:n | clip`.

4 To test the tweak, start by right-clicking a folder full of files. You should now see the option 'Copy file list to clipboard'. Click on it. After a command window briefly flashes, open Notepad and press Ctrl-V to paste a list of files in that folder into the document.

Nick Odantzis

HARDWARE

[I CAN ONLY RUN BENCHMARKS]

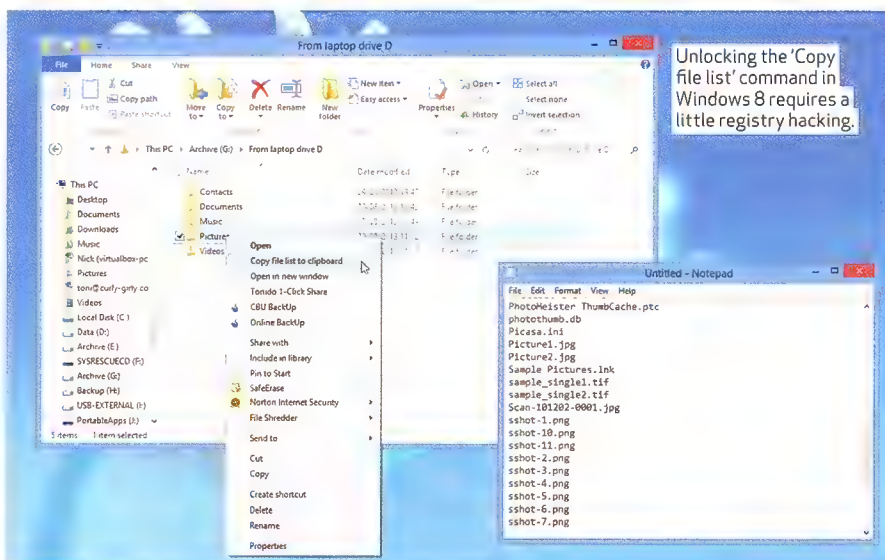
I have an EVGA GeForce GTX 660 Ti SC graphics card. After a bit of playing games like War Thunder, Star Conflict and, yes, even Anno 1404, the computer will restart. The card is currently back at the supplier and they have been testing it for two days

EVGA's own PrecisionX tool will help identify temp spikes and help with fan adjustment too.



with no problems found. Great, no problems — but they are running benchmarks on the card and my benchmarks do not crash out either. If I put an MSI 560 Ti in, I do not get the errors. I have checked the temp of the card and the max it gets is 70°C. If the supplier can't find an error, then they are giving the card back, so I will sit with the same problem. I have done a driver upgrade to the latest EVGA drivers available and downgraded to 314.22 of the drivers, and yes, I also did a full driver removal and clean with Nvidia driver cleaner.

Gerrit



Unlocking the 'Copy file list' command in Windows 8 requires a little registry hacking.

From the crash logs you included, I see that you're getting error 0x116 in dxgkrnl.sys. This is also sometimes listed as VIDEOTDR_ERROR, and if you search Microsoft or Nvidia forums you will invariably be told that this is a driver error. Which is odd because you have already ruled this out. And yet, if it's not a software error, it must be a hardware fault. In which case your supplier ought to be able to replicate it. Despite what you say, benchmark programs are a perfectly valid way to stress-test graphics cards. So not hardware and not software — what a puzzling paradox!

Except it's not, because we think we have the answer. There is some quite convincing research to show that VIDEOTDR_ERROR can be caused by sudden temperature spikes on the graphics card. While 70°C is normally a safe upper temperature, you have to remember that the thermocouple that measures this temperature doesn't react instantly. This means that it effectively records a rolling average of the temperature, and brief spikes might climb way beyond 70°C before the thermocouple (and therefore the fans) can respond. These temperature spikes will depend on what games you're running, but also on the cooling within the case. Most repair shops don't bother to put the lid back on for systems they are testing, so they generally get better cooling than they would under your desk.

If you use Precision X (www.evga.com/precision) you'll be able to override the GPU fan speed. Try locking it to a constant 75% speed and see if that helps. Or rather, revel in the realisation that it definitely does help. Luis Villazon

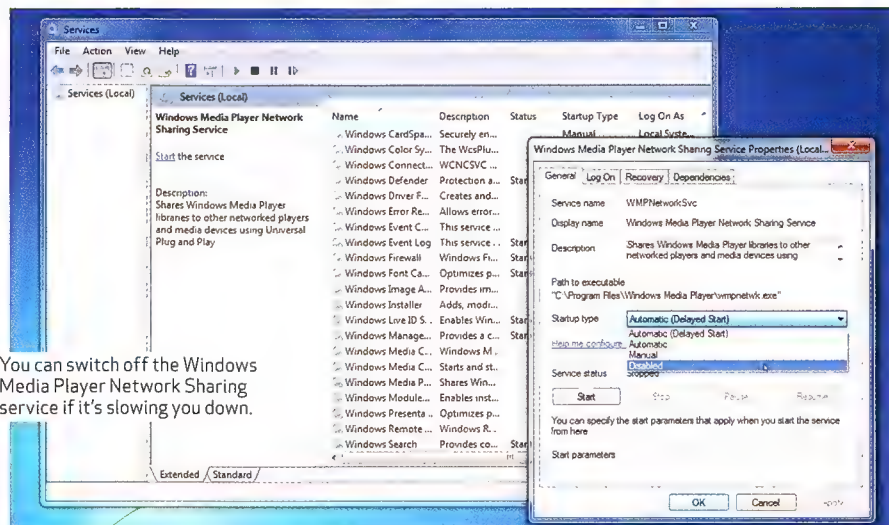
WINDOWS

PROCESSES SLOWING DOWN PC

I'm running Windows 7 and there are a couple of programs that seem to hog resources: Windows Media Player Network Sharing Service and MS Windows Search Filter Host. I'm currently suspending both processes using Resource Monitor, but as I don't share any Media Player stuff, how can I get rid of the first one, and what exactly does the second program do? Bruce Alexander

To disable the first hog, first open Windows Media Player. If Library isn't greyed out, click it and select 'Media Sharing', then untick both boxes before clicking Apply. As you don't use Media Player, the Library will probably be greyed out, so you will have to disable the service itself. To do this, press Windows-R, type `services.msc` and press Enter, clicking Yes when prompted. Scroll down to the Windows Media Player Network Sharing Service entry, right-click it and select Properties. Click Stop to halt it, then set its Startup Type to Disabled before clicking OK.

The Search Filter Host is part of the Windows indexing process that speeds up searches for files and folders on your hard drive. The service should normally stay in the background and not grab processor power when your PC is in use. Once you've disabled the Network Sharing Service it should cease to be an issue. Nick Odantzis



You can switch off the Windows Media Player Network Sharing service if it's slowing you down.

LINUX

OLD BUT SMART

My old-ish Linux desktop PC is showing a 'SMART: Secondary Master Hard Status Bad' error on booting. The BIOS was updated a few months ago, but I am unaware if SMART was even configured previously to that. It has only one hard drive, configured as cable select. Googling the error message gives me everything from 'disable in BIOS and ignore' to 'the world as we know it is doomed'. The computer seems to be running pretty normally when I hit F1 to continue the booting process. I'm more frequently backing up essential data though. Greg S.

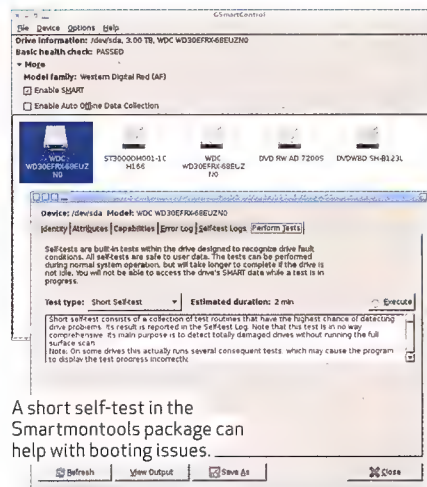
We'd say there's more than a touch of "ish" about it being old if it is still using IDE drives. To be on the safe side, replace the cable, and configure as either master or slave rather than relying on cable select, which can be a bit unreliable. This is unlikely to be the cause, but cables cost a lot less than new hard drives.

SMART, or Self-Monitoring, Analysis and Reporting Technology to give it its full name, is self-diagnostic software built into modern hard drives. A SMART error doesn't necessarily mean your drive has failed, it means the SMART tests indicate a problem that may lead to failure. The advice to disable SMART in the BIOS is akin to fixing low oil pressure on your car by disconnecting the warning light – you'll feel better right up until the moment that disaster inevitably strikes!

To get more information on the situation, install the Smartmontools package for your distro, open a terminal and run:

```
sudo smartctl -i /dev/sda
to check that your drive is recognised.
Then run the short self-test with:
sudo smartctl --test=short /dev/sda
```

There are a number of tests you can



A short self-test in the Smartmontools package can help with booting issues.

run, with increasing detail, time taken and impact on system usage. The short test completes in a few minutes and can be run while the system is in use. The command returns immediately, you can see the progress and results with this command:

```
sudo smartctl -c /dev/sda
```

Look for the lines reporting 'Self execution status' as this shows how much of the test remains and, once the test is complete, the outcome. If you see an error here, start backing up immediately. You usually see the last five errors with:

```
sudo smartctl --log=error /dev/sda
```

In addition to smartctl, the Smartmontools package contains smartd, which is a daemon that runs in the background and keeps an eye on your disks. It will send you an email when it finds a potential problem.

You will need to edit /etc/smartd.conf to set it up; the file contains comments explaining what to do. If you find all this command line activity a little intimidating, there is a graphical front end, called GSmartControl, but it does not give quite the same level of control. ■

Set up your macro project for success

Helen Bradley takes you through the steps to do before you start coding a macro.

When you encounter a task in Word or Excel which lends itself to being automated using a macro your initial response may be to open the VB Editor and start writing the code. A better starting point is a text editor where you can write an outline of your solution. Then spend some time setting up your testing environment. This month we'll look at those tasks which you should do before you start coding.

WRITE A PSEUDOCODE SOLUTION

Before you write your code you need to know what code to write. Planning your solution using pseudocode will help as it lets you focus on the solution rather than the code. Using pseudocode you write a natural language description of your program step by step focusing on how the problem will be solved.

Let's consider a simple Excel task for incorporating daily downloaded data into an existing worksheet. In your workbook, sheet A contains the

historical data and sheet B contains the new day's data. All the row headings in sheet A are also in sheet B but there may be additional headings in sheet B which must be added to sheet A.

Your macro should add the missing row headings into sheet A. Assuming that both lists are sorted, this is a possible pseudocode solution:

```
Go to sheet A
Select cell A2
Repeat until you reach an empty cell
    Compare the current cell contents to those in the corresponding cell in sheet B
    If they are different, add a new row in sheet A
        set the value of first cell in this new row to that of the corresponding cell in sheet B
    If they are the same, then do nothing
    Move down one cell in sheet A
Loop
```

SET UP A TESTING ENVIRONMENT

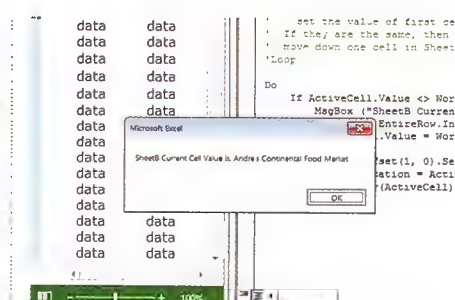
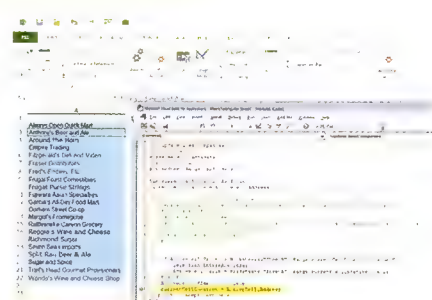
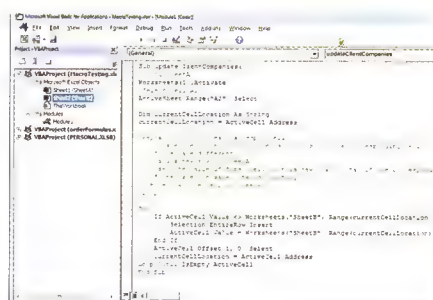
If your workbook contains thousands of entries it's a good idea to mock up a smaller version for testing. Create a workbook with two sheets named as they are in the actual workbook. Use sample data copied from the original workbook and ensure that there are items in the second sheet that are not in the first sheet. Using a small representational subset of data lets you test and troubleshoot the macro more easily. ■

Get it

Download the file you need for this article from www.apcmag.com/magstuff.

Write the solution

Pre-test your code before you begin.



1 USE A SAMPLE
Launch the Visual Basic Editor and add a module for your code. Paste the pseudocode into the module and use it as a reference when writing your code.

2 TEST IT
Test the macro by placing the Visual Basic Editor and the Excel workbook side by side. Click on the Sub statement and press F8 to step into the code. Each time you press F8 the next statement is executed and you can watch the progress on the actual worksheet.

3 ERROR CHECKS
If you encounter problems, add one or more message box statements to show the value of a variable, cell contents or cell address at that point in the code. These will show the values that the macro is using and may help you troubleshoot issues.

disc contents

» OUR SELECTION OF EXCLUSIVE FULL-VERSION PROGRAMS

ISSUE 405, AUGUST 2014

All-in-one music editing program

Create, edit, design and produce music with Ashampoo Music Studio 4

FULL VERSION WORTH \$32

Ashampoo Music Studio is your all-in-one solution to create, edit, design and produce your music. It takes only a few clicks to achieve great results. Digitize your audio and enjoy the everlasting high quality of digital music. Notebook computer, music player or mobile phone — listen to your favourite music, anywhere any time. Take control of your music collection and adjust your songs to your personal needs. Catalogue your music collection and never lose track of your audio discs again. And with your files now digitised, converted and modified, it's time to write them to disc, either for storage, easy listening on your CD player or as a gift to a friend. Why not also add some variety and merge your tracks to create new ones?



FIND IDENTICAL FILES ON YOUR PC

Locate duplicate data and take control of it with 1-abc.net Duplicate Finder

FULL VERSION WORTH \$21

In times where thousands of files are located on a computer, sometimes it is very hard to find the one you're looking for. This very easy-to-use program helps you to detect duplicate files on your machine, on external hard drives, on CDs, DVDs, USB sticks and camera cards. With 1-abc.net Duplicate Finder you will never have to worry about duplicates, copies and double-up files any more!



EASY-TO-USE CREATIVE COMMONS IMAGE FINDER

Abelssoft CCFinder 2014 helps you locate free-to-use Creative Commons images.

FULL VERSION WORTH \$14

CCFinder is short for Creative Commons Finder and it finds pictures published under the Creative Commons License. This means that you can easily search for pictures that you can re-publish or share without breaking the law or having to pay money. CCFinder also explains what you may do with each picture and what to keep in mind when doing so.

SYSTEM REQUIREMENTS

- A DVD-ROM reader or burner.
- The APC disc is designed for use with up-to-date browsers (for example, Internet Explorer, Chrome, Firefox).
- The interface included on the APC disc requires a JavaScript-enabled browser.
- An internet connection may be required for online registration of software before use.
- The software packages on the APC disc have different system requirements. Software is included on the disc for Windows XP, Vista, 7 and 8.

BEFORE INSTALLING

- Check the disc using a virus scanner complete with the latest antivirus data updates. The disc was checked before burning, but new viruses are being discovered all the time.
- Back up any important system and data files. It is not recommended that the software contained on these discs be installed on production machines.
- If you have any questions regarding the use of the APC disc, click the 'Help' button at the top of the screen.

USING THE DISC

- Insert the disc into a CD/DVD-ROM reader or burner and your web browser should automatically load the interface. If not, launch your web browser and load the default.html file from the root directory of the disc.

HELP

- If you have any problems with the APC disc, please visit www.apcmag.com/disc.htm.
- APC provides no technical support for this disc or any software provided on it.

NO DISC?

Please note that the free cover disc is not included with special promotional copies of APC.

PLUS! SPACE QUEST: DECISIONS OF THE ELDERS [FULL GAME] & HOME OFFICE ESSENTIALS TOOLKIT

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Master Windows' Jump Lists

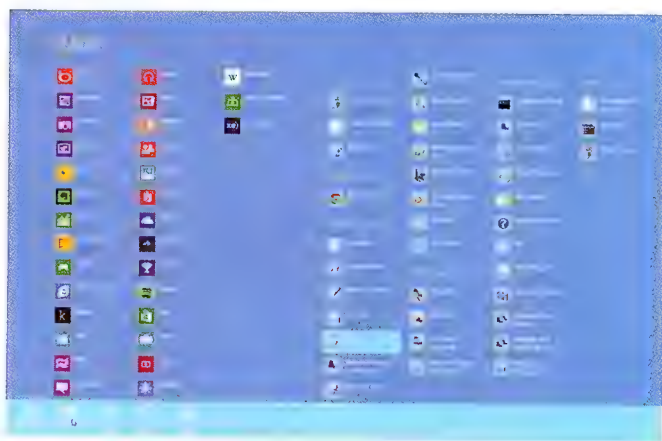
You can open your documents and programs easier than ever by using customised Jump Lists.

Windows is packed with features that make your life easier and more productive, but none gives you as much control over your files as Jump Lists. These lists, as the name implies, provide easy access to your most common files and let you jump to them with a couple of mouse clicks. We're happy to say that this spells the end of those frustrating trawls through folders, hunting for a file you use all the time.

Jump Lists enable you to quickly open recently opened files, but as well as being a brilliant way to save time, clever Windows users have found other ways to exploit Jump Lists to make them even more useful. One we've been playing around with is Jumplist-Launcher, a free Windows 8 application that enables you to drag and drop files, programs and shortcuts to build completely custom lists. It also works in Windows 7, albeit with some slight changes to the steps below.

Master Jump Lists

Here's how it works.



1 PIN IT DOWN

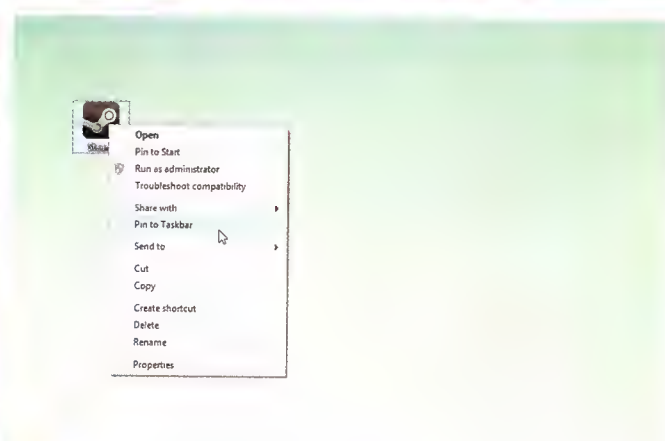
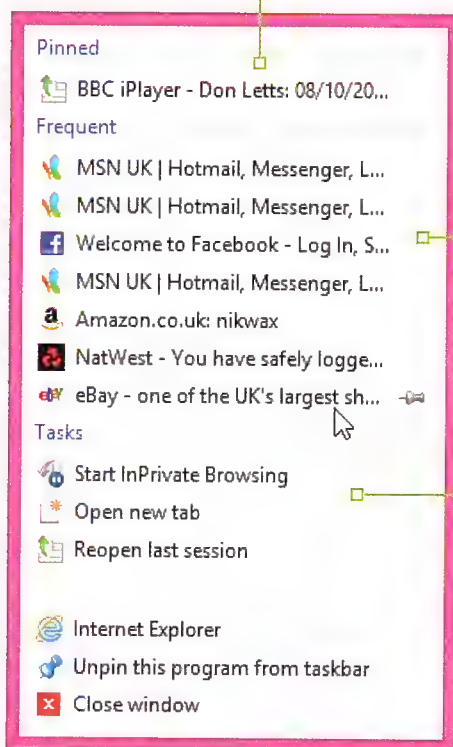
In Windows 8, apps found on the new Modern UI Start menu reflect the most commonly used programs in your arsenal, and it's possible to add them to your desktop Taskbar right from here. Simply click on one (or more) and right-click the bottom of the screen to activate the menu. Then, click (or tap) on the 'Pin to Taskbar' option to pin it.

PIN IT

When you pin a site it appears in the top area of the Jump List menu. Just hit the pin to the right of something to pin or unpin it.

FREQUENT FILES

Depending on what you're using Jump Lists for, it's reflected in here. In ours, you can see all the web sites we visit most often.



2 TIDY TASKBAR

The Taskbar works as a dock for all your programs, and you can launch your favourite ones from there. If there's something you use a lot — and it doesn't just have to be a program, you can pin folders, URLs and documents to the Taskbar, too — just right-click on the program icon on your desktop, and choose 'Pin to Taskbar' to put it in place. Add more if you like.

and home essentials

Shop now >



Cosy home >



Men's clothing >

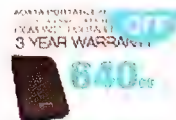


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Jargon buster

Icon

A small image or logo that you double-click to access a file, program or folder.

Jump List

A Windows feature where some programs have extra right-click menus, populated by recently-used shortcuts, files and templates.

Modern UI

The name of the new Windows 8 user navigation system, but also the name of the design language Microsoft has been developing since Windows Phone 7, which focuses on clean typography.

Taskbar

The bar at the bottom of the screen, which holds open programs, windows and folders. In Windows 7 you can pin programs to the Taskbar permanently.

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LIST OPTIONS

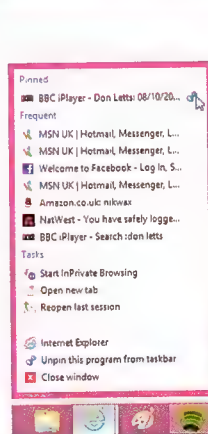
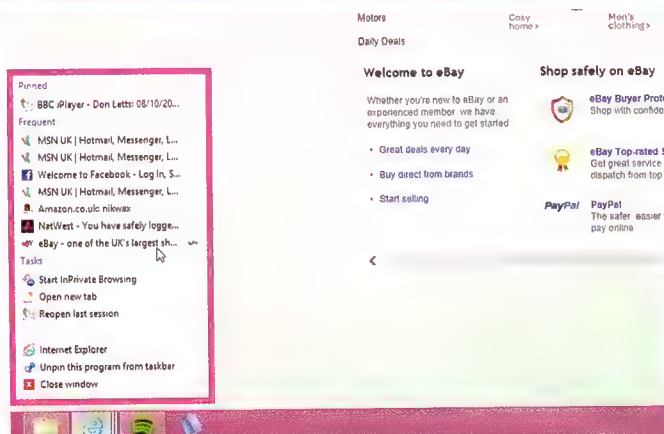
Near the bottom of all Jump Lists are options to do more with the program, such as unpinning it from the Taskbar or performing specific tasks.

TASKBAR JUMPS

To access any Jump Lists, simply right-click any of the programs found in your Taskbar and the Jump List will appear straight away.

DOING MORE

We're using Jump Lists in this example to help us do more with Internet Explorer. eBay was opened straight from the Jump List.

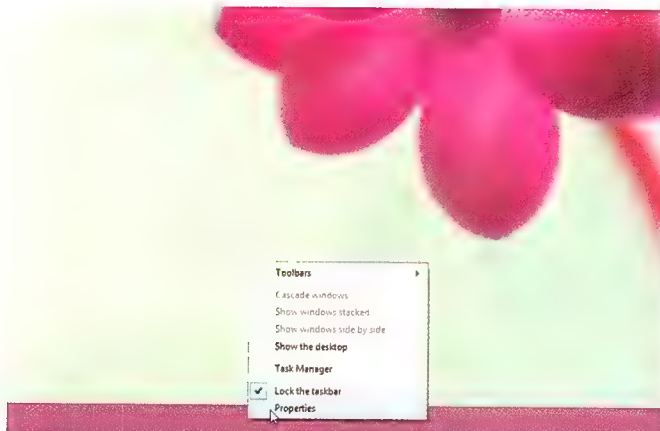


3 RIGHT-CLICK TO FIND THE LIST

Most programs — and that includes Windows Live, Windows programs such as Microsoft Paint, and a whole host of third-party applications — add Jump List functionality to the Taskbar. To access a program's Jump List, all you need to do is right-click on its Taskbar icon and from the menu that appears, you can open the program or choose from recent files.

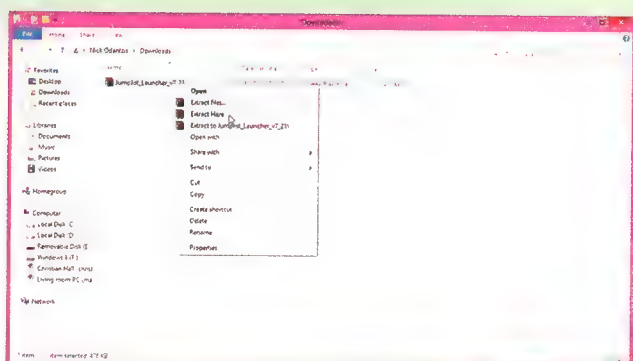
4 SAVE TIME

When you open files associated with programs on the Taskbar, they appear on the Jump List. By default, there's space for 10 items, and the entries change frequently as you open more files. If you want to ensure that an entry remains on the list, it's possible to fix items in place by clicking the pin icon that's found on the right, after the entry you want to retain.



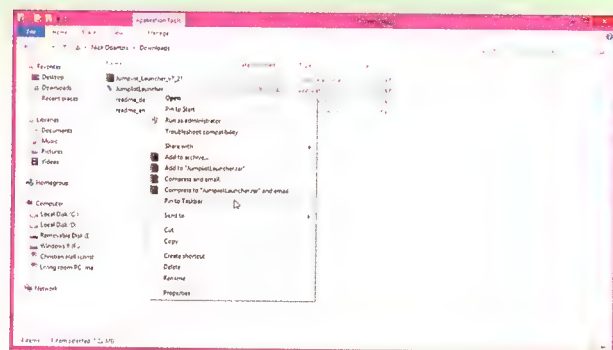
5 MORE FOR YOUR MONEY

Like most parts of Windows, the Jump List menus are fully customisable, and you can change the size of the menu according to your tastes using the Start menu properties. To make some custom adjustments to your Jump Lists, just right-click the Taskbar and go to Properties, click the 'Start menu' tab and choose Customize.



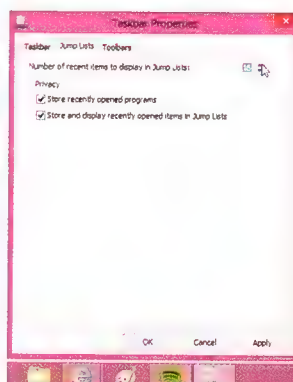
7 SET UP JUMP LISTS

If the Jump Lists in Windows help you work more effectively, try Jumplist-Launcher to build custom Jump Lists (tinyurl.com/yzvibgo). To open the file, you need a copy of WinRAR, which you can get from www.rarlab.com. Click downloads and then choose the 32-bit or 64-bit version.



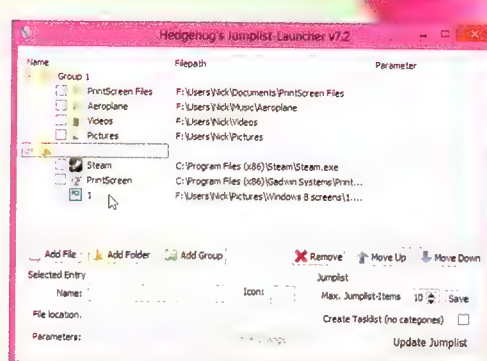
9 READY WHEN YOU ARE

Once you've set up Jumplist-Launcher, you will want it to stay on the Taskbar permanently, or you will find yourself being forced to reopen the program every time you restart your computer. To do this, just right-click the Jumplist-Launcher icon and then choose 'Pin to Taskbar'. Now it will always be easy to access whenever you want it.



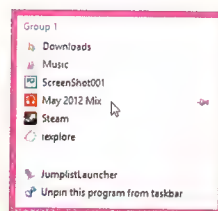
6 UP THE NUMBER

At the bottom of the Customize window, you can change the number of default entries that your Jump Lists display. The default is set at 10, but you can type in any number you wish, which enables you to create massive lists with access to all your files — or, if you prefer, you can save on space with minimalist access as required.



8 CUSTOMISE

Once it's downloaded, unzip Jumplist-Launcher, install it and once it's up and running, open it, then drag and drop files, programs or shortcuts into the main window. Once you've done all this, it's very easy to order your Jump Lists so they're how you want them — all you need to do is click the up and down arrows at the side.



10 READY FOR LAUNCH

Now that you've organised your life a little more, when you start your computer, you can just right-click on the Jumplist-Launcher icon on your Taskbar to bring up the customised list you created earlier. You can pin these in place by clicking the small icons to the right of the items, just as you can with all your other Jump List options.

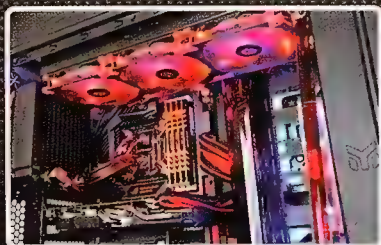
CORE V71

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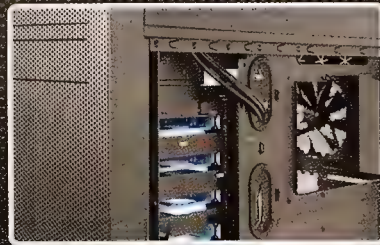
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Easy PC monitoring

Keep a stack of GKrellM monitors on your desktop to tell you about everything your PCs are up to at a glance, says Richard Smedley.

GKrellM is a great local system monitor, easy to configure, pleasing to the eye, yet undemanding of system resources. It monitors your PC, and can also be used to monitor remote machines.

This should be a feature that GKrellM shouts from the rooftops yet it's just whispered quietly, some way down the main page, where one reads: "Data can be collected from a gkrellmd server running on a remote machine." It also mentions using the `-s` switch to collect data "from a gkrellmd server." We'll show you how in more detail, as well as general GKrellM usage to monitor a local machine.

This isn't enterprise monitoring – let's be thankful for that, and leave the dreary, demanding configuration of Icinga or Zabbix for those who really need it, across large networks of mission-critical boxes. What GKrellM gives you is a good set of defaults, easily configured; some nice plugins to expand functionality; and easy remote monitoring with gkrellmd. We'll walk you through all three aspects of GKrellM's personality.

Development on GKrellM is not very active – but that's in part because the core functionality of this mature project is stable. Additional features can be added by plugins. And one benefit of the slowed-down development is that it's easy to get the latest version via your distro's package manager.

Should you really need to compile from source, the latest release can be downloaded from: <http://billw2.github.io/gkrellm/gkrellm-2.3.5.tar.bz2>

Dependencies are minimal – gtk 2.0, gdk 2.0, glib 2.0 – with the server version needing only glib 2.0 or glib 1.2. If you want to see if there's anything appearing in development, then clone the git repository at `git://git.srbox.net/gkrellm`

Installing and running GKrellM should leave you with a directory – `./gkrellm2/` – which contains the

config file, and a place for plug-ins and themes. You'll also get some documentation on GKrellM's many components under `/usr/share/doc/`. For the most part there's no need to worry about the text files that you find here – configuring GKrellM is all done through the GUI.

GETTING STARTED

First, let's fire up the app and take a look – your package manager should have placed an entry in your distro's menu to run GKrellM, and for starting with the defaults that's just fine. As you'll see from the screenshots, what you get is a neat stack of monitors, within an attractive enough default theme, telling you about everything from CPU load to battery life.

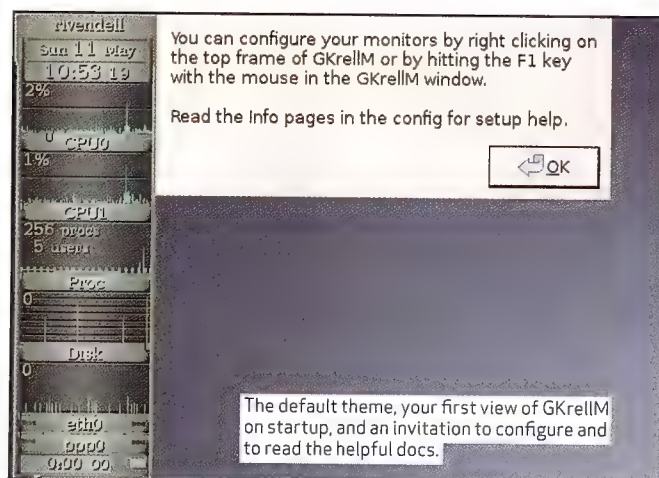
Right-click on the system name at

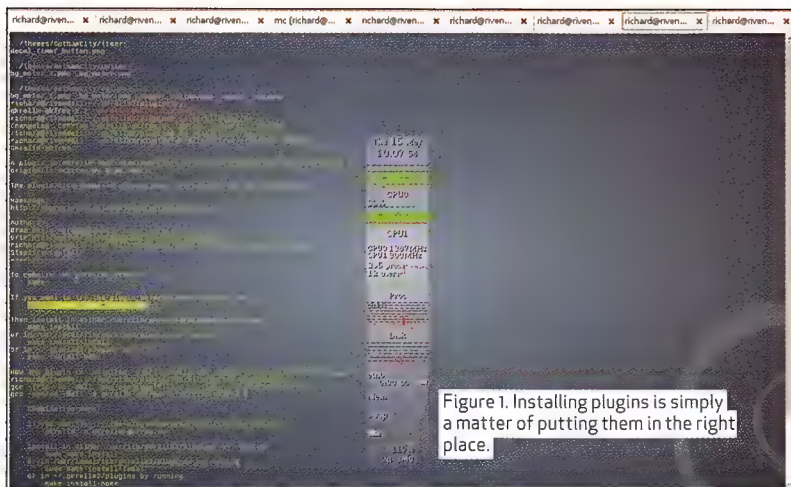
the top of the display, and you'll get a customisation menu with choices for GKrellM's general behaviour and settings, and for each component meter or chart – covering what's displayed, and even whether to display that meter at all.

Some Format String options allow for very flexible selection of display parameters, and info tabs give a lot of help and guidance in getting the best out of your GKrellM display. Right-clicking on a particular meter or chart takes you straight to that component's part of the config menu.

If this little box of tricks is going to sit happily in the corner of your monitor, you'll want to change it to fit in with your desktop's appearance.

By default, there are no window decorations from your window





manager, as GKrellM has its own way of decorating, but if you want it to have the same border as other apps that you run, then start with the `-wm` switch. Add in the geometry switch and you can place where on the screen GKrellM places itself (though naturally alt-click drags it around on any window manager, as with any windowed piece of software) – so to go near the top right of a 1,280 x 1,024 screen:

```
gkrellm -wm -g +1170+30
```

ANY WAY YOU LIKE IT

But never mind your window manager's idea of what a window decoration looks like; with GKrellM themes you can customise every pixel of its display. Look at www.muhri.net/

gkrellm – there's a lot of themes. Find a couple you like to download for now, then unzip to `~/gkrellm2/themes`. On a shared machine you could put them in `/usr/local/share/gkrellm2/themes` or even `/usr/share/gkrellm2/themes`.

For compatibility with Gtk themes, you can also install to `~/themes/THEME_NAME/gkrellm2` or `/usr/share/themes/THEME_NAME/gkrellm2`. As Andrew Tannenbaum once said: "The nice thing about standards is that there are so many of them to choose from."

Wherever your theme now resides (and starting GKrellM with the `-t` switch can grab a theme from anywhere you point it), the config menu will allow you to select your preferred theme, and change the font size to suit your screen. You can toggle between

installed themes by simply hovering the mouse over GKrellM, and switching with PageUp/PageDn. There's a pleasing lack of lag in this, as with most operations on GKrellM, even on our ancient test PCs. By collecting everything together in one lightweight process, GKrellM author Bill Wilson has given us one of the quickest changing skinnable applications.

GKrellM's lightness of tread on your system's resources, combined with this easy themability, explains its popularity amongst those who care most about the state of their desktop – the power users with highly-configured minimalist window managers.

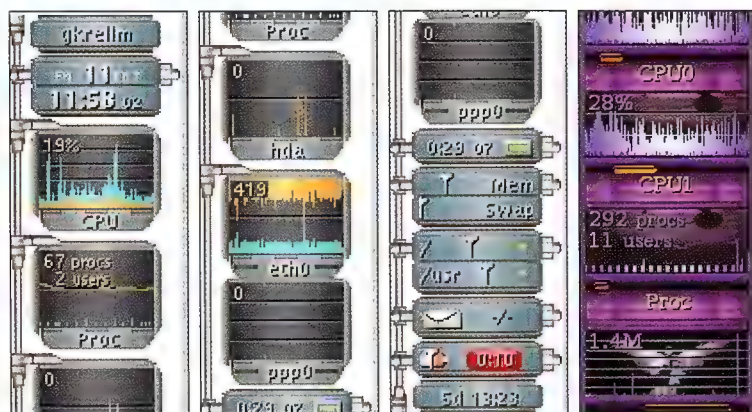
There's a whole world beyond GNOME, KDE and Unity – from NeXTStep clones, through Plan-9-inspired window managers, to tiling displays which need no mouse intervention. For users of alternative window managers, the GKrellM FAQ lists ways of adding it to the startup of many more window managers than you've probably ever tried.

People running these window managers tend to care about every pixel displayed in their working environment – and often keep older hardware running, where every CPU cycle and KB of memory use has to be accounted for too. All this not relevant for your 8GB, quad core, Ultra-HD laptop? Maybe not, but you do get to benefit from GKrellM's flexibility, all the same.

In some combinations of colour and chart size the movement of the CPU meters is strangely hypnotic – if you

DIY Themes

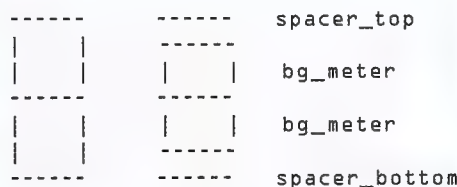
The large number of themes available is a good indication that theming is both well documented and not too difficult. The guide is at <http://billw2.github.io/gkrellm/Themes.html>



The hardware theme (first three pictures) puts your system monitors on a (virtual) hardware rack. In the GothamCity theme, the orange CPU meters pulse on the purple background in a strangely hypnotic manner.

Essentially, GKrellM components are either meters, having a simple panel to them, or charts, with a more colourful display, and a separate panel area. Add in control of the frame, background images, and every component used in the meter and chart displays, and the themer has total control.

You can even use top and bottom spacers to visually group sets of monitors:



The left column is without spacers, the right is with spacers. From garish to subtle to nearly invisible – it's all up to you.

find yourself staring dazedly at them for long periods of time, perhaps you should switch to a less distracting theme. Or run GKrellM on another desktop window, and just switch to it periodically to check on whatever it is you're most concerned with. There's a reason most of the themes available are black or grey: it's unobtrusive.

PLUG-IN

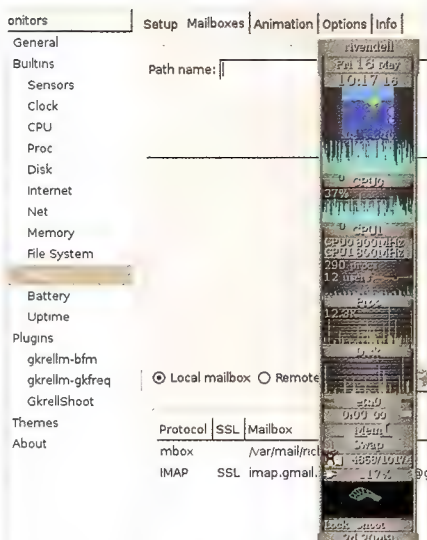
Of course if you can't get on with any of the available themes, you can always build your own – it's not that difficult, thanks to a logical layout and good documentation (see *DIY Themes*, previous page). But themes are just skin deep, and for many users extending functionality is what really makes any software flexible and useful.

Unfortunately some plugins on the GKrellM web site are a bit patchy when it comes to working with the latest GKrellM and recent kernels and distros. Some of them are effectively abandonware – although, as open source projects, they're ready for updating if you need what they offer. Indeed, updating a small program to work with more recent libraries is a great learning experience. More immediately fruitful, perhaps, is a search of GitHub, which reveals relatively recently developed plugins.

Quick tip

If this is the first time you've tried SSH tunnelling, you may want to read a guide to get your head around the topic. Try: tinyurl.com/y9dwyw3

It's also a great way to protect mail and other traffic when you're on insecure Wi-Fi somewhere.



Point GKrellM at a local or remote mailbox to see you've got mail – in fact you're a very long way from #inboxzero.

One useful module is Brad Davis's GKrellM-gkfreq, which displays CPU frequency – very handy in these days of power-saving CPU cores, to observe how speed is scaled under different loads, and between mains and battery power. We downloaded the plug-in from its Sourceforge web site, untarred it and ran the make script. There's no need to install in order to see how a plug-in works – just call it with the `-p` flag like this:

```
gkrellm -p gkrellm-gkfreq.so
```

but `sudo make install` will save you doing that again once you are happy with a plug-in's suitability and stability.

As you can see from the screenshot (Fig 1 on the previous page), activated plugins get their own configuration window in the config menu, with some – such as GKrellShoot, the screenlock

Quick tip

After clicking remote mailbox and entering your webmail's IMAP details in the mail config menu, you must click New for it to add the mail account – not just the OK button at the foot of the page. Otherwise, there'll be no tumbling penguin telling you you've got an overfull inbox, and that'd be tragic.

and screenshot plugin – giving a useful amount of documentation through the GUI's tabs, too. Many plugins offer functionality that isn't confined to system monitoring, such as interfaces to media players, the contents of the clipboard, or a readout of local weather.

If you're comfortable with C, a browse through GKrellM-gkfreq's clear and well-documented code will tell you much of what you need to know to write a GKrellM plugin but – as with themes – there's a comprehensive manual written for plugin writers: tinyurl.com/mxe62x6. If documentation were given its due recognition in the Free and Open Source World, GKrellM would certainly be up for some laurels.

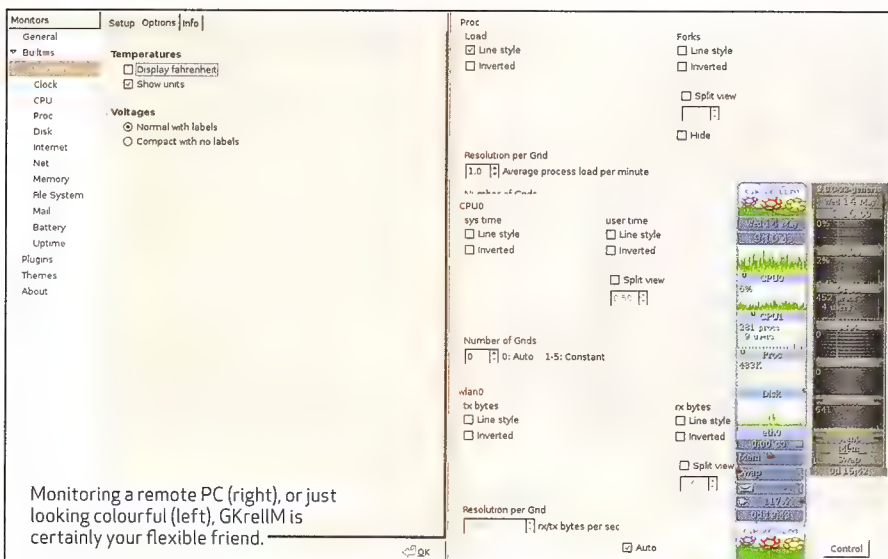
ACROSS THE WIRE

Now you've got GKrellM set up just so for your own PC, it's time to expand across the network. GKrellM can be run in 'client mode' to listen to a GKrellM daemon process on another machine across the network – using the `gkrellmd` package, which collects the same sort of data and sends it across the wire. Like the main GKrellM packages, `gkrellmd` will be in your package manager.

Having installed `gkrellmd` you need to open up `/etc/gkrellmd.conf` in your favourite text editor and find this block:

```
#allow-host localhost
#allow-host 127.0.0.1
#allow-host ::ffff:127.0.0.1
#allow-host 192.168.0.*
```

You may find that your distro and its installer have given you some of these lines without the `#` to comment them out – in the case of Ubuntu and Debian, the three localhost lines are uncommented; if you build from source, they're all commented out. Uncomment the entries. If your local network is not on the 192.168.0.0/24 subnet, then adjust accordingly. You can also set a different port number from the default 19150 – something you'd better do if you've got more than one `gkrellmd` on your network.



Monitoring a remote PC (right), or just looking colourful (left), GKrellM is certainly your flexible friend.

You can put the allowed host info into command line arguments, to test out different scenarios, like so:

```
nohup gkrellmd -u 2 -P 27770
-m 1 -a 192.0.0.1 -a
192.168.0.7 &
```

This allows connections from localhost, and 192.168.0.7, over port 27770. The `-u` parameter determines how many times per second to update the information and `-m` is the maximum number of simultaneous clients. This is worth configuring as you don't want to leave any sort of hole in your control over use of system resources – it's the `max-clients` directive in `/etc/gkrellmd.conf`.

Your installer should put a startup script in the appropriate place to run the daemon after reboot. You could modify the startup command there, but configuring `/etc/gkrellmd.conf` is eminently more sensible.

You can put GKrellM onto Windows boxes to keep an eye on them, too, if you have any in your network. Note that swap, memory use and various other attributes may not be read in the same way, and some settings are ignored completely – there's no `/mail` mbox for mail alerts, for example. `/etc/gkrellmd.conf` notes Windows exceptions in the comment by each directive.

Now, wherever you are on your network you can keep an eye on whichever boxes you've got gkrellmd installed on. The simplest approach is to fire up GKrellM to listen to the machine you want:

```
gkrellm -s 192.168.0.6 -P 27770
```

Whichever port you use, if your firewalling is strict, you'll need to open up that port for TCP traffic. Once you've got local and remote monitoring in place, you can experiment with positioning GKrellM where you want it on-screen using the following:

```
gkrellm -s 192.168.0.6 -P
27770 -g +1060+30 &
gkrellm -g +1170+30 &
```

You could drop these commands into your `~/.xinitrc` file – or wherever is appropriate for your window manager – in order to start up GKrellM automatically when you log in.

TEXT DATA

GKrellM is receiving plain text – the currency of Linux communication – across the wire. You can see this by running the client in debug mode:

```
# gkrellm -s 192.168.0.6 -P
27770 -d 0x1000
```

Other debug options can be seen by running:

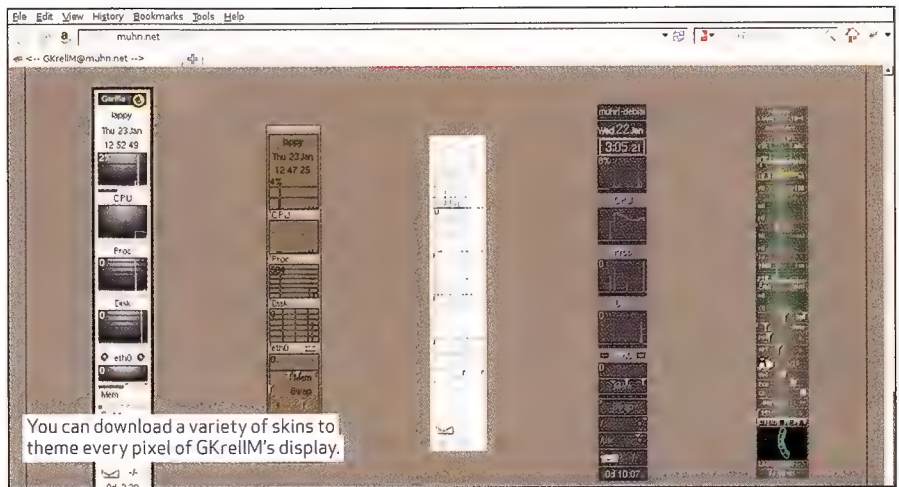
Network recipe

If you've become convinced of the efficacy of automating everything, and even use Chef on your home network, there's a GKrellM Chef cookbook – as the incantations to roll out software through Chef are called – at: github.com/locomote-cookbooks/gkrellmd

This will also take care of setting the port used, and the hosts allowed, to your own preference for your network.

Chef uses a Ruby-based domain-specific language (DSL) for writing system configuration 'recipes' which install and configure software across your servers (and, as there is no real difference in the Linux world, your desktop PCs too). It may be over the top for most home networks, but if you do a lot of tinkering, testing or development, and find yourself often re-installing the same packages, Chef – or one of the other open source configuration management tools – may save you a lot of time in the long run.

The GKrellM cookbook has been tested on CentOS and RHEL version 6.3, "but should work for Ubuntu and Debian," says the recipe writer, LocomoteChris. You can find more details at: community.opscode.com/cookbooks/gkrellmd.



```
gkrellm -help
```

Having a look at the server data dump can be helpful not just for debugging, but for connecting other monitoring software to the gkrellmd data.

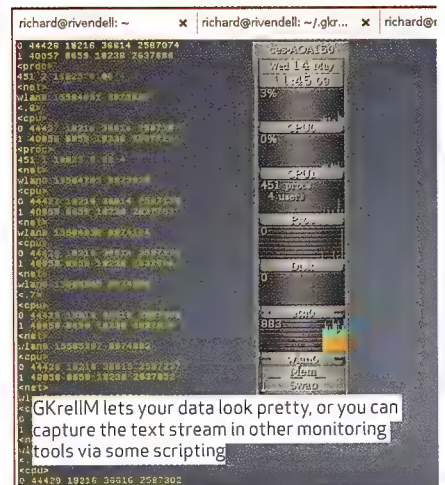
SECURE CONNECTION

If having all this data running round your network, and over your Wi-Fi, in unencrypted form makes you nervous, it's time to get tunnelling. One of the great features of SSH is its ability to carry any sort of traffic through a safe-from-eavesdroppers tunnel, with port forwarding.

Just pick an unused port – here it's 19143; 19150 is GKrellM's default port if you don't modify the config.

```
ssh -f -N -L
19143:localhost:19150 remote-
box.com
gkrellm -s localhost -P 19143 &
```

If all this is not enough flexibility for you, there's also a set of PHP5 classes for talking to gkrellmd: <http://php-gkrellm.sourceforge.net/> –



though it's not actively developed, so you may need to work with it to get it doing what you want for your own web interface to GKrellM data.

Given its light demand upon system resources, incredible configurability, yet easy setup, we're confident you'll fall in love with GKrellM like we have. ■

Extending Automator with AppleScript

Automator's pre-built Actions might not do everything you need to do, but Matthew JC. Powell shows you how you can increase its functionality.

Over the past few issues we've been having a look at Automator, OS X's drag-and-drop tool for automating the repetitive tasks you do with your Mac. Hopefully you've been inspired to have a bit of a play with it and discovered the many and varied powers it possesses.

Unfortunately, it doesn't do everything — not every possible user requirement has been anticipated by the boffins at Apple who wrote the various Actions that are included. You can find additional Actions on various web sites and some can be bought from the App Store as well. But, if you're prepared to get your hands a little bit dirty, you can also write your own.

Automator Actions are basically just AppleScripts. AppleScript has been part of the Mac almost since the very

beginning, but it's been the preserve of power users because, frankly, it's not that easy to use. Automator makes it easier to use, but doesn't completely eliminate the need for occasional coding when you've reached its limits.

For this tutorial, we'll write two Automator Actions — one that you can use as a Service so it's accessible across all applications, and one that you will use as a standalone Application to speed up an action in the Finder. (Note that OS X Mavericks has introduced significant changes to some parts of AppleScript, with more changes expected in Yosemite. Therefore we'll stick to very basic scripting for these exercises.)

COUNTING WORDS

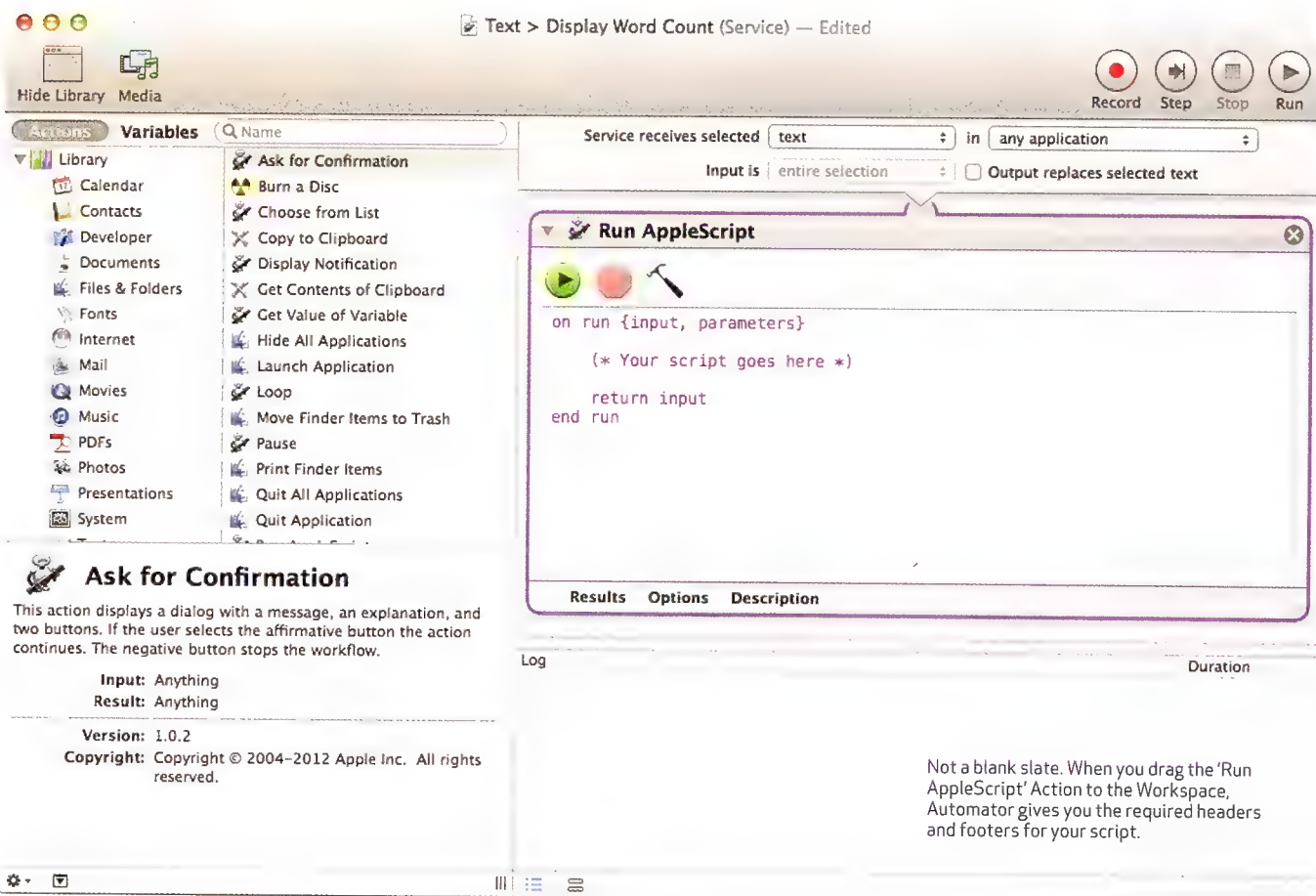
Pretty much any text editor or word processor you use includes a word

count function — an essential tool for writers. But few other applications do, and that can be a problem. What if you need to know how many words are in a story on a web site? You could copy the text and paste it into a text editor, but that's frankly inelegant.

Oddly enough, Automator's pre-built Actions don't include word counting. So, if you want it, you'll have to build it.

Open up Automator, and select Service as the type of workflow you want to build. Go to the Utilities section in the Library, and find the Action called 'Run AppleScript', then drag that into the workspace. Ensure that the 'Service receives selected ...' menu is set to text (which is the default) and that 'Output replaces selected text' is not selected.

You'll see an empty AppleScript with header and footer already in place.



Enter the script as shown in the screenshot. Basically what this does is define a variable called 'MyWordCount', and sets its value as a count of the words you've selected (the input), then displays a dialog box with that value followed by the word 'words' – don't forget the leading space. Also don't worry about the formatting and colours and stuff – when you test your script by clicking on the green play button, Automator will set it all out nicely for you.

Save the Service as 'Text > Display Word Count' and you're in business. Pop over to an application such as Safari, select some words, and then select your newly-created tool in the Services menu.

HIDE AND SEEK

If you're a tinkerer (and why would you be reading this if you were not) then you know that Apple hides certain System files from prying eyes. There are good reasons for this – for the most part, no one needs to touch them, and they are best left alone. Not to mention that fact that keeping them hidden leaves things a lot cleaner.

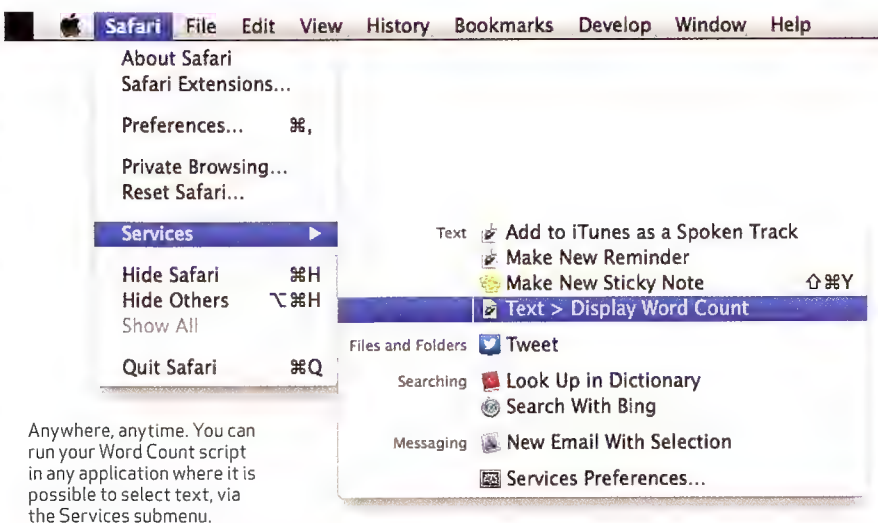
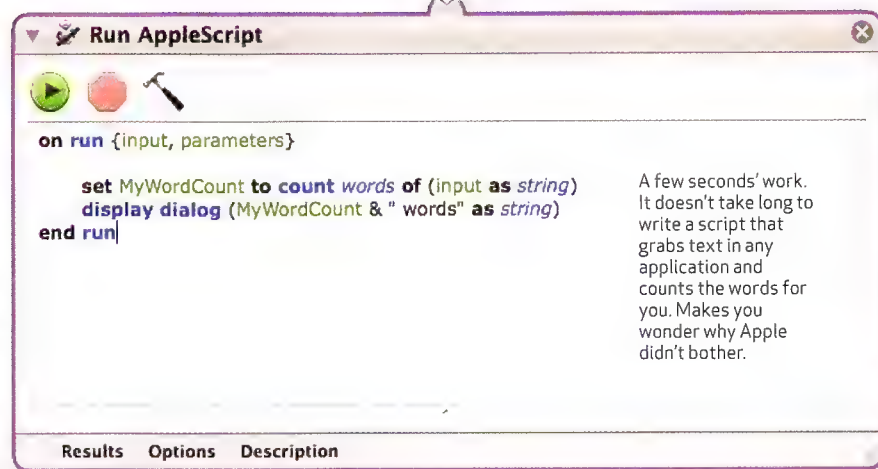
Sometimes, though, you need them. Just temporarily. It's not a big deal to go into the Terminal and un-hide them, but then you've got to go back and hide them again later. If you do this frequently, it's a drag. So, write an Automator Action that toggles the status of hidden files. Simple.

Again, open Automator, but this time tell it you want to create an Application. You'll note that at the top of the Workspace it reads 'Application receives files and folders as input' – that's because Applications, unlike Services, work at the file system level.

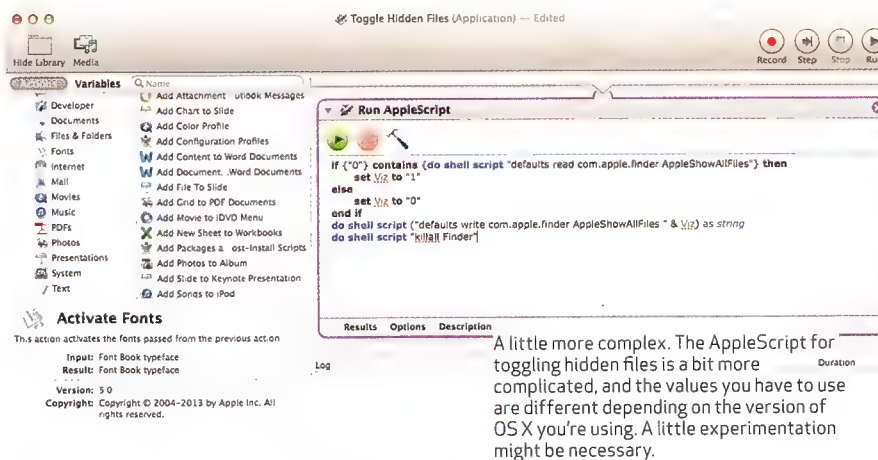
Drag the 'Run AppleScript' Action into the Workspace, and type in the AppleScript as shown in the screenshot. What this does is run a shell script (without having to open the Terminal) to check the value of a setting in `com.apple.finder` (the Finder's preferences) – if `AppleShowAllFiles` is 0 then those System files are hidden; if it's 1 then they're not.

The script creates a variable called `Viz`, and if `AppleShowAllFiles` is 0, the value of `Viz` is 1. If `AppleShowAllFiles` is 1, `Viz` is set to 0. It's very important to note here that these are the values assigned to that variable in OS X Mavericks – in Mountain Lion or Lion, `AppleShowAllFiles` could be either `TRUE` or `FALSE`, and in earlier versions it was `YES` or `NO`. You should adjust your script accordingly, depending on what version of OS X you're running.

Next, it runs another shell script to set the value of `AppleShowAllFiles` to the value it's just set for `Viz` (which, of course, is the opposite of what it was a



Anywhere, anytime. You can run your Word Count script in any application where it is possible to select text, via the Services submenu.



second ago). Then it restarts the Finder to accept the new values.

Save your Application as something logical like `Toggle Hidden Files`, and place it on your Dock or your Desktop or wherever you want to put it. When you run it, the screen will go blank momentarily, then switch back on with the visibility settings altered. And remember not to fiddle with any hidden files unless you know exactly what you're doing.

Writing AppleScripts manually is just one way of extending Automator's capabilities. You've probably noticed the Record button at the top right of the window – that actually enables you to record your actions as an AppleScript. We'll look at that another time.

Block ads on your Android handset

Simon Chester shows you how to remove the ads from your browser and apps alike.

Ads are a funny thing in apps. I love apps, and the person or team that dedicated their time to producing them should receive compensation for doing so. However, in the highly competitive app market, sometimes the best way to gain the most traction is to offer your app for free, and subsidise that lack of up-front cost with advertising. This, really, is only fair.

To be frank, though, I just hate ads. Ugly, intrusive, often irrelevant, ads serve as a constant reminder that the only reason I work a job is to buy things that I don't really need. Like special Blu-ray collector editions of *Fight Club*.

This is why I always opt for 'paid' versions of apps – I'd just rather not see ads. Sometimes, though, there isn't a paid 'ad-free' version available. Sometimes I let this slide, but if the ads are inelegantly integrated into the app, or the ad servers chosen by the developer are of the deceptive 'I unread message' or 'buzzy-shaky-flashy' style, then I'll do what I can to remove them.

Xposed users

If you run the Xposed framework on your device, then you can install the awkwardly named MinMinGuard module from the repository. Unfortunately, the developer was over-run with guilt for denying developers their hard-earned dollars, so has now ceased development. It still runs well, but there is nobody adding in new ad networks, so it won't work forever. It's open source, though, so there's a chance that development will continue sometime in the future.

Alternatively, root users could run AdAway (sufficientlysecure.org/index.php/adaway), which replaces the system host file with one that blocks ad servers.

17:51 47%

< Edit access point

Name
Virgin Internet

APN
yesinternet

Proxy
localhost

Port
26571

Username
Not set

Password
Not set

Server
Not set

MMSC
Not set

MMS proxy

Non-root users have to manually set proxies to divert traffic through Adblock Plus.

17:44 48%

The Mollusk

Manual

The HTTP proxy is used by the browser but may not be used by the other apps.

PROXY HOSTNAME
localhost

PROXY PORT
26571

BYPASS PROXY FOR
example.com,mycomp.test.com,localhost

IP SETTINGS

DHCP

CANCEL SAVE

Thankfully, it's almost trivially easy to block ads on your handset – and not just in your browser, but system-wide. In fact, it's as simple as installing a free, open source app: Adblock Plus.

Now, because of the controversial nature of ad-blockers (and the fact that Google is first and foremost an advertising company), Google decided to remove Adblock Plus from the Play Store back in 2013. This doesn't really pose a problem, though, as all you have to do is enable installation of apps from unknown sources (for most phones, this is under 'Android Settings > Security > Unknown Sources'), then visit adblockplus.org from your handset and hit the green 'Install for Android' button.

Configuring the app is equally easy, although it differs slightly for rooted and non-rooted handsets.

If you're rooted, it should work automatically after you grant it Super User permissions (if a message appears

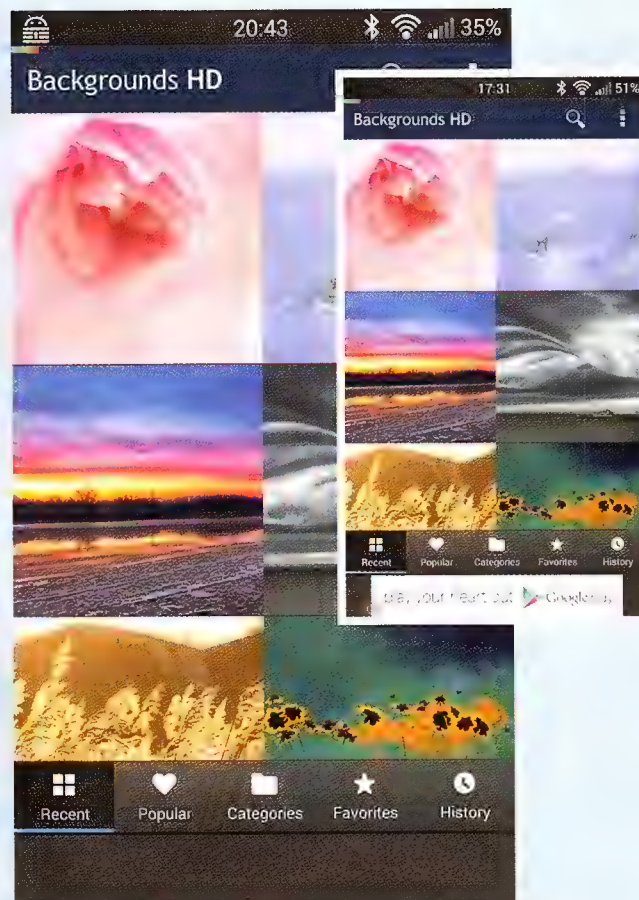
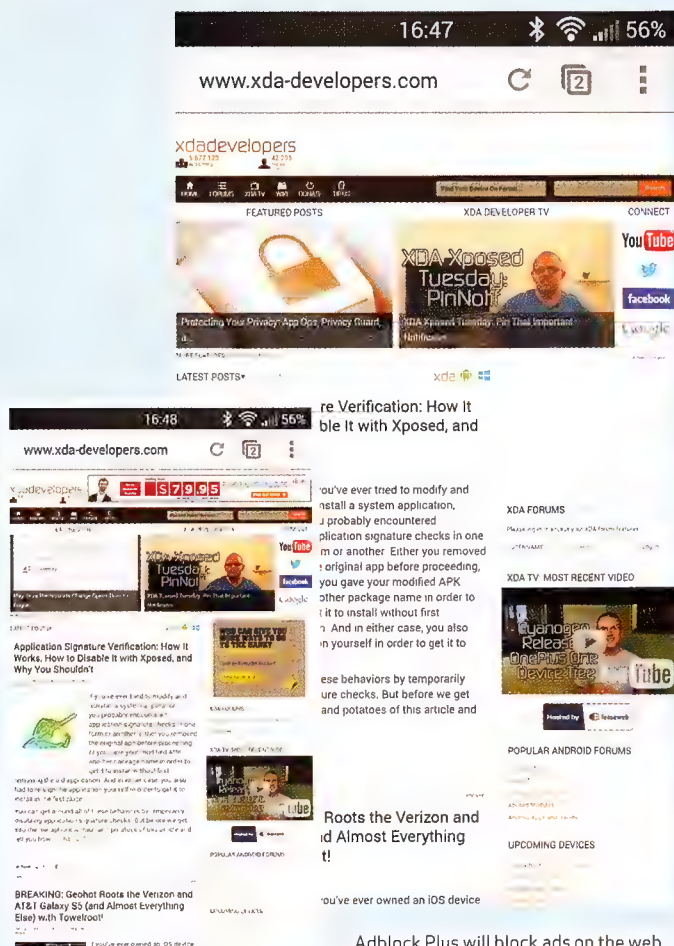
up top saying that it couldn't configure your proxy servers, just reboot your phone, and it should work from there on out).

If you're non-rooted, then you will need to manually configure your proxy settings to divert all traffic through the Adblock Plus app.

First up, you'll need to edit your Wi-Fi proxies. You can do this by visiting 'Android Settings > Wi-Fi'. Long-press on your current Wi-Fi network, and choose 'Modify network' and then 'Show advanced options'. Next set a manual proxy with hostname 'localhost' (without the quotes) and the port number specified in the Adblock Plus notification message.

Note that this method will only block ads when you're connected to this particular Wi-Fi network, so you'll have to repeat the above steps for each Wi-Fi network that you use.

To block ads over a mobile connection on a non-rooted device,



Adblock Plus will block ads on the web... ...and in apps.

some users have reported luck by modifying their APN settings. You can do this by going to 'Android Settings > Mobile Data > Access Point Names'. I recommend that you take note of your existing values for Proxy and Port, before changing them to the same values as above. If your connection then stops working, you can simply change them back to their original values.

Within the Adblock Plus app you'll find some extra settings that may be of use to you.

The big switch up the top allows you to disable Adblock Plus, in case it makes an app cranky or something. Just below that, you have the option to change or update the list that defines what ad servers are blocked. The standard 'EasyList' is fine for most users, but if you frequent foreign sites, you should press 'Filter subscription' to choose a language-specific list. Also, you can press the refresh icon to manually update to the latest version of the list (by default, it updates automatically).

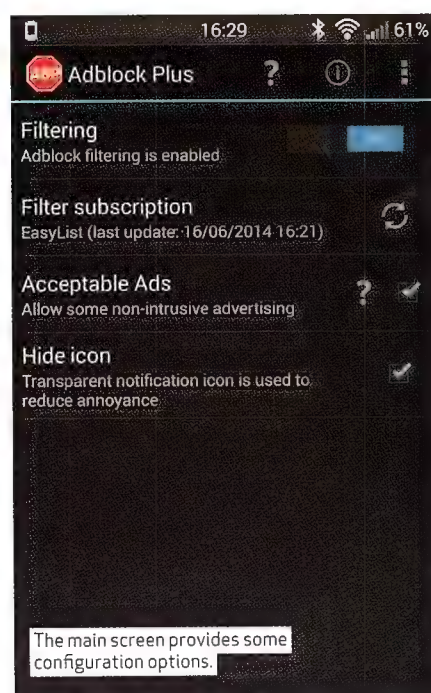
Next down the list is the option to allow 'Acceptable Ads' — this is a great idea, as it encourages advertisers to make their ads less annoying. The thinking goes that annoying ads will always get blocked, but ads that

follow a set of requirements (no blinking lights etc) will be shown to Adblock users and gain more exposure. Let's hope it gains some traction, as the ad-supported model is actually very good for many businesses and developers. You can learn more about this movement at acceptableads.org.

Speaking of annoying, the final option allows you to hide the annoying icon sitting in your notification area. Unfortunately, due to the way that Android handles memory allocation, it's not possible to remove it from the drop-down notification drawer, but at least it isn't permanently glaring at you from the top of your screen.

If you don't want to use Adblock Plus all the time, then you should press the menu button (the three dots) and go to Advanced Settings, where you can choose to have it run at startup or not. Here, you can also change the frequency that the filter subscription (block list) is updated, as well as if you want to allow it to be updated over a mobile connection, or just Wi-Fi.

Now, as a final caveat, it should be noted that Adblock Plus won't block every single ad out there — there are ways for both web sites



and apps to circumvent the methods that Adblock Plus (and other ad blockers) use, but it will block the majority of ads from every appearing on your device, and hopefully restore some of your sanity. ■

Open any file in iOS

iOS can view a few files natively — here's how to open the rest.

As more and more people start to use their iPad as a real work machine and their iPhone as a primary way of managing emails on the move, we need them to be compatible with more and more weird and wonderful things we want to do — every job is a little different, every hobby has its own needs. This means we need iOS devices to be able to view a huge range of file types, from simple text documents to complex design layout, to 3D models, to high-quality sound recordings, to fun videos. The iPad can view many file types out of the box with no extra software, but in some cases, it needs a bit of help from the App Store.

Of course, app developers have responded by creating a huge range of apps for handling lots of different files, from the common to the rather specialist. Using the 'Open In...' option in iOS, you can send files to apps that support them, many of which let you do much more than just view what's in the files. Some have great editing capabilities, and ways to share the files with others if you need to.



The 'Open In...' command in iOS lists any apps you have that could work with a given file.

A lot of the time, unexpected files arrive by email, so we'll show you how to open a file in another app directly from the iOS mail app.

When someone sends you a URL to download a large file, or you just find one online that you want to download, the lack of a file system can seem to hold you back; there's no obvious way to do it, but we'll show you a way around that, too.

Jargon buster

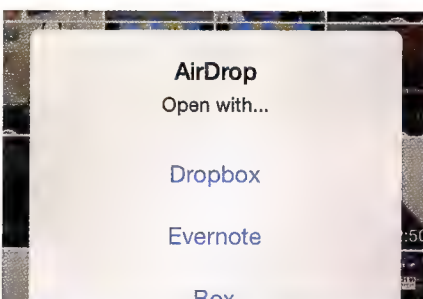
Open In... is a standard iOS control that's usually available in the Share pop-up menu of an app. In iOS 7, it's just three circles in a white square. Tap it and you'll be shown a list of apps that tell iOS that they work with that file type — tap the right one.

Get the files



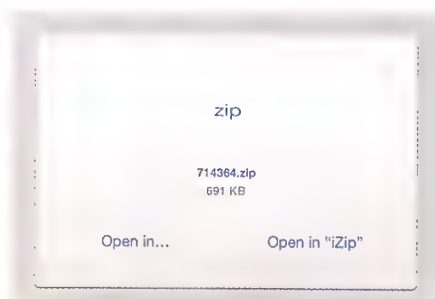
1 OPEN FROM EMAIL

If someone emails you an important file, you find it in the email (often at the bottom) as a little square. Once you scroll down to it, it downloads to your device (if it doesn't do this automatically, you can tap to start the download). Press and hold on the file to display a pop-up menu, which shows options for sharing the file or sending it to an app.



2 OPEN FROM AIRDROP

If someone shares a file from another device with you over AirDrop, you first get a notification asking if you want to receive the file. Accept it and the file is transferred. If it's one of the file types that iOS usually recognises, you're told what kind of file it is, otherwise you have to guess from the file name alone. Once it's been received, you can choose which app to send the file to.



3 DOWNLOAD WEB FILES

If someone sends you a link to a web URL where a file is hosted for download, you can often open it with the right kind of app. If you don't have one at the time, you can save almost any file to certain apps — we recommend Dropbox. When you go to the file's URL, there's an option in Safari to open the file with whatever app it thinks is appropriate, or you can choose one yourself.

WORK WITH ANY FILE FORMAT

OFFICE FILE FORMATS

iOS is capable of viewing many office document types natively, without the need for extra apps. Microsoft Office and Apple Pages documents are all supported, as well as TXT, RTF and PDF. When you receive one, just tap it to open it.

If you want to edit these files, there are plenty of options. Microsoft Office for iPad is free for viewing documents, and will always format Office files correctly, which other apps can struggle with. However, you have to pay a yearly subscription if you want to edit documents. Apple's Pages, Numbers and Keynote apps are free to anyone buying a new iOS device, and let you open and edit MS Office file types, Apple's KEY, PAGES and NUMBERS file types, CSV files, RTF and TXT.

For OpenOffice file formats, including ODT, ODS and ODP, you can view them for free using OODReader (though complex documents might require an IAP to unlock the Pro version for \$3.79). To edit these document types, use the Documents Unlimited Suite for iPad (\$6.49).

If you need to annotate or sign a PDF, Adobe Reader is a good free option, which also lets you open encrypted PDFs (which many legal documents may be sent as). If you're working with lots of PDFs, however, GoodReader is a more organised way to manage these files.

If you're sent documents in ZIP form, you can sometimes use iOS's Quick Look option to view the contents. For properly unpacking ZIP or RAR archives, though, use the free app iZip, which can unzip these formats (as well as many others) even if they're encrypted, and create its own ZIP files.



The iZip app shows you contents of a ZIP file, and lets you choose what to do with each file extracted.

CREATIVE FILE FORMATS

For files created by creative pro apps, there's often not much in the way of editing, but there are viewing options. PSD Photoshop files can only be opened by Adobe's Photoshop Touch app if they come through its Creative Cloud service. Use the free PSD Viewer for Photoshop to open these files on iOS generally. For AI files, grab the free 'doctape viewer' app, which is a cloud service that actually converts the file to a PDF for easy viewing. For InDesign files, there are a couple of apps that rely on InDesign's built-in preview image to enable you to view files: the free ADOView and SneakPeek (\$12.99). In both cases, you have to tweak your InDesign settings before they can work properly, but in the case of ADOView, this is explained in the app. To view EPS files, you can use doctape viewer again. For SVG files, use the free Inkscape app – this works best if you use 'Open In...' to save the files into Dropbox, then use Inkscape's Import command and built-in Dropbox support.

For DWG CAD files, you can use the free AutoCAD 360 app to view and edit the files, or use CAD View 3D (\$6.49) to view more CAD file types. ATView 3D Professional (\$24.99) from the same developer is compatible with a wide range of 3D app file types. For Rhino 3DM files, use iRhino3D (\$4.99).

IMAGE FILE FORMATS

iOS can view JPEG, PNG and TIFF files without extra apps, but while Apple's iPhoto app is capable of opening many raw photo file types using the iTunes File Transfer feature, it can't open them directly from on the iPad. You need an app called PhotoRaw (\$12.99, though there's a Lite version too), which can open a huge range of raw file formats – including those from Canon, Nikon, Olympus, Sony, Samsung and many more – and perform basic edits and export to JPEG. iOS doesn't support viewing GIF files natively when sent in emails (though it does in Messages, oddly). Open them in Adobe Reader and you'll be able to see the animation, though.

AUDIO/VIDEO FILE FORMATS

MP3, WAV, AIFF, WAV and M4A in AAC or Apple Lossless audio files (up to CD-quality 16-bit in our tests) can all be played natively by iOS. For FLAC, AmpliFLAC Free lets you listen to up to 120 seconds of a song without paying. Equalizer Pro (\$3.79) lets you listen to both FLAC and OGG tracks.

For video, the iPad can play most MP4 and MOV videos natively. For MKV, WMV and AVI files, use the free-but-basic VLC for iOS app, or the great AVPlayerHD (\$3.79). ■



PSD Viewer is recommended for viewing your Photoshop documents.

Project #19 – Enigma Cipher Machine

Dive into the world of cryptography as Darren Yates turns an Arduino Uno into a working copy of the famed German encoding machine.

It was the technological weapon designed to keep German communications secret during World War II – but the secret within the secret was that British Intelligence had cracked the Enigma cipher machine, giving them invaluable knowledge of Hitler's plans. It's often said this 'Ultra secret' shortened the war by many months.

Enigma may be simple by today's cryptography standards, but it was the efforts to crack the more complex Lorenz SZ40/42 machines that led to the construction of the first all-electronic computer called 'Colossus' in 1943.

While it was shrouded in secrecy during the war, Enigma's secrets are well known today – enough for us to turn an Arduino Uno microcontroller into an Enigma Cipher Machine.

THE DESIGN

More specifically, our project this month is a fully functional copy of the German Army or Wehrmacht Enigma, implementing the three-of-five rotor system (along with the software implementation of the actual rotor wiring), user-settable rotor start

positions, plugboard and rotor ring settings or 'ringstellung'. I've created the software (sketch) from scratch, based on technical information available at the UK Museum of Computing at Bletchley Park (www.codesandciphers.co.uk/enigma/rotorspec.htm). Bottom line, any message encoded by a real Wehrmacht Enigma machine can be decoded by our little black box (with the right settings, of course).

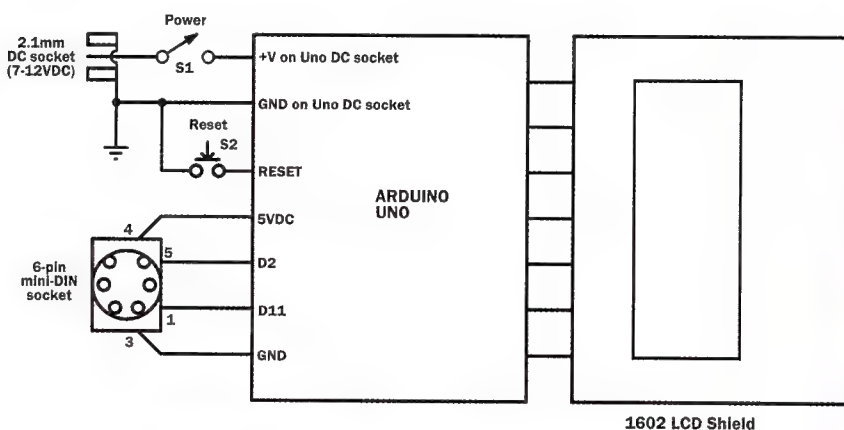
The hardware design is simple



Our Arduino Enigma Cipher Machine.

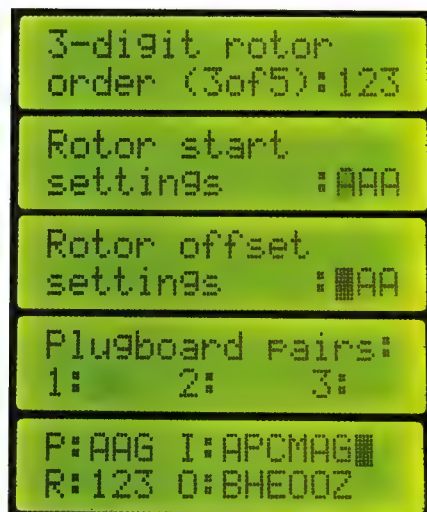
enough – a standard Arduino Uno R2 or R3 microcontroller board, a 1602 LCD shield plus a six-pin mini-DIN panel socket, a couple of switches and a PS/2 keyboard.

What started out as a simple project to show you how you can connect a PS/2 keyboard to an Arduino as an input device quickly evolved beyond that. In context, you use the keyboard to set up the Enigma's settings and type in either your 'plain text' or encoded message. The Arduino



apc

ARDUINO ENIGMA CIPHER MACHINE



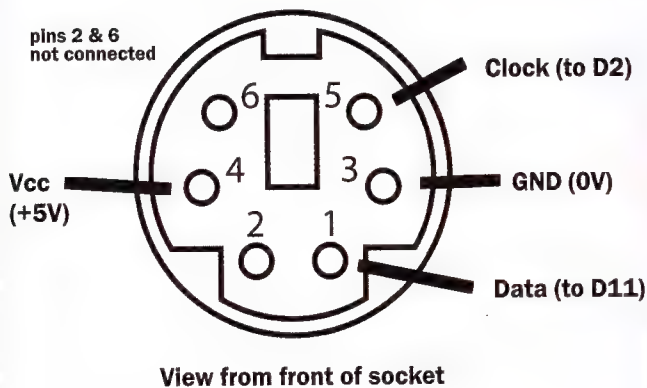
The Arduino Enigma machine guides you through the setup process.

The circuit diagram of our Arduino-based enciphering machine.

Decode this!

Enigma army messages were originally transmitted over radio in five-letter groups with operators splitting decoded groups to form the original words or 'plain text'. Built your Arduino Enigma? Try decoding this message:

I-II-III APC MAG DY AP CM
OLCRH ICCKD CWWMO ZQFNR ISPCI KREKM
VMSLI BJZGM DXDEJ WXQZQ EI



Pin-out diagram of the PS/2 six-pin mini-DIN socket.

instantly encodes or decodes each letter, displaying it underneath your typed input.

HOW THE REAL ENIGMA WORKS

Electrically, the Enigma machine is little more than switches, wire, light bulbs and a battery, but its brilliance lies in its ever-moving rotors that continually change the encoding key. They ensure that pressing the same keyboard key lights up a different encoded letter each time. The Wehrmacht machines feature three rotors from a choice of five, all wired differently; navy machines use four from eight. Each rotor consists of two discs with 26 pin and contact terminals on the outer side of each disc and wiring between the terminals on the inside. It's this wiring that creates the first layer of encryption. But as further rotors are added, the connections between rotors and their incremental rotation on each key press create over 17,500 possible circuit combinations. These combinations are expanded by the 60 different ways of choosing three rotors from a possible five and swapping the rotor order. But it was the addition of the plugboard with its 150 million million ways of wiring letter pairs that pushed up the total number of combinations to over 15 million million million. The plugboard allows you to swap letters on the keyboard,

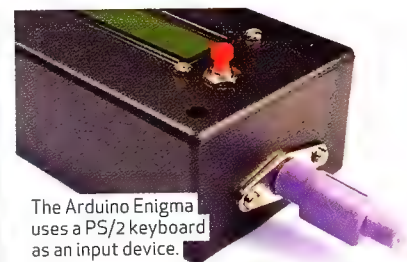
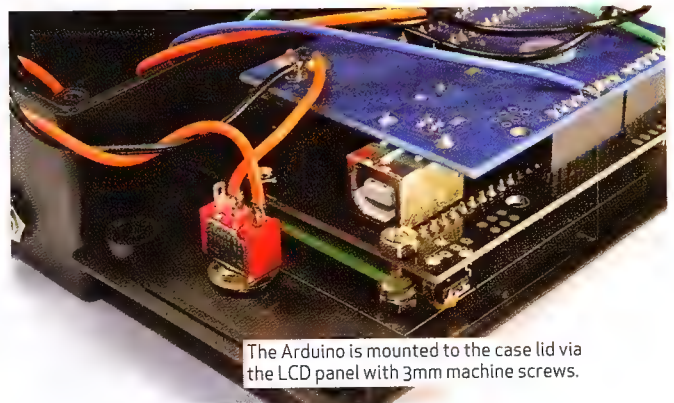
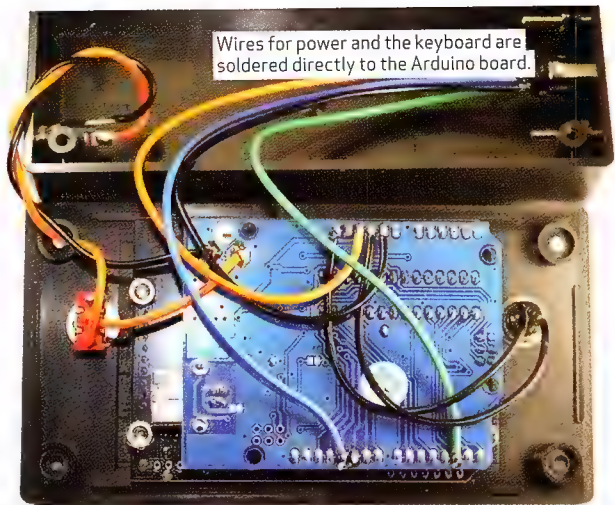
so for example, swapping 'E' and 'T' would effectively change the keyboard from the standard German keys 'QWERTZ' to 'QWTREZ'.

The key to Enigma's design however was the last built-in rotor called the 'reflector' – it completed the electrical circuit, enabling the machine to encode and decode letters. If you started with the same rotor selection/position/ring points, typing an 'A' would give you an 'E' for example, but typing an 'E' would also give you the original 'A' – and that's why Enigma was so potent (this was also one of its weaknesses). In the end, its compact design and ease-of-use meant thousands of Enigma machines were used by all branches of the German armed forces.

SOFTWARE EMULATION

There's a basic principle of computing called the Principle of Equivalence that states that any task done by software can be performed by hardware and any operation carried out by hardware can also be achieved in software.

In my Arduino source code or 'sketch', we've turned the rotors into software elements called 'arrays', which are variables with multiple elements, each referenced by an index number – a bit like units in a block of flats. The block is the array and each flat is an element in that array. The array elements are



arranged so that the index becomes the common link between the rotor arrays. This allows us to follow the 'wiring' and keep track of the correct key combination based on the rotor start position and ring setting.

THE HARDWARE DESIGN

The 1602 LCD shield replaces the Enigma's lamp board – in normal operation, it displays the current rotor position (P) and the rotor order (R) on the left. On the right, the last seven characters are shown – your input (I) on the top and the encoded/decoded output (O) underneath.

The Enigma mechanical keyboard is replaced by a PS/2 keyboard here, made possible by the freely-available PS2Keyboard library. All we need for electronics is a six-pin mini-DIN panel socket wired directly to the Arduino. The PS/2 keyboard operates off a 5VDC supply rail and has two data lines –

one for clock signal and another for keyboard data. These connect to pins D2 and D11, respectively, on the Arduino. The library enables us to read the data from the keyboard and know which key is pressed.

The momentary normally-open (NO) pushbutton switch provides a reset button, pulling the Arduino's reset pin to ground (0VDC), restarting the Enigma software.

We've built our Arduino Enigma Cipher Machine into a small jiffy box from Jaycar Electronics, using 3mm machine screws and nuts through the mounting holes on the 1602 LCD shield to hold it in place. We've also added a 2.1mm DC panel socket to the box chassis and soldered it to the Arduino's built-in DC socket. This allows us easy access to external power but also to incorporate a simple SPDT (single-pole double-throw) power switch. Power can be supplied by any 7-12VDC power brick with tip-positive voltage polarity. (Make sure you wire it up with the right polarity to the board.)

HOW TO USE IT

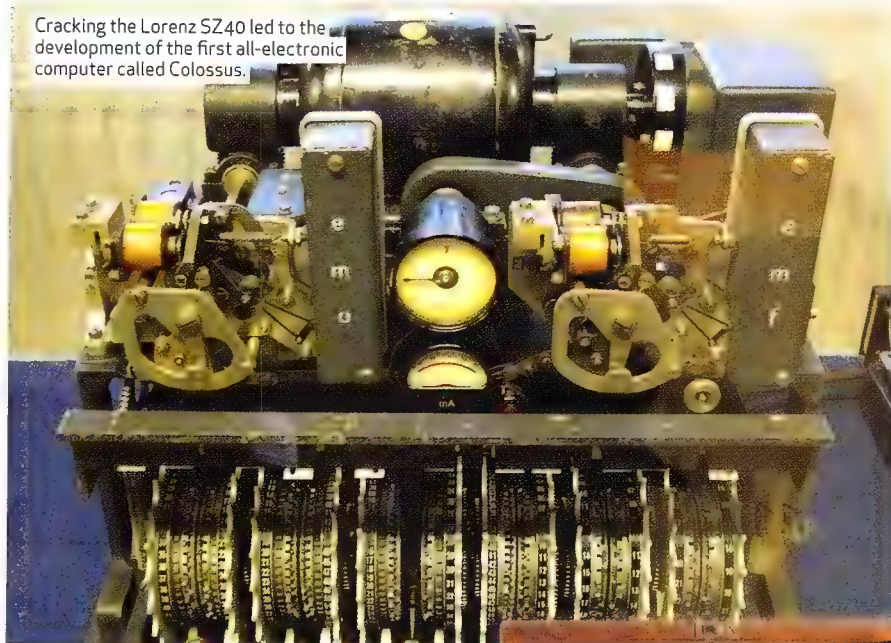
Using the Arduino Enigma is similar to a real Enigma machine. You start by setting the rotor order – remember, you have a choice of five, so to select rotors I, III and IV in that order, left to right, you enter '134' on the keyboard. You can use the left and right arrow keys to change individual rotor settings, the Enter key to move to the next setting.

After that, you set the initial rotor start position – for example, 'APC' sets rotor I to position 'A', rotor III to 'P' and rotor IV to 'C'. The next setting is the rotor ring setting or 'ringstellung', which rotates the internal ring wiring

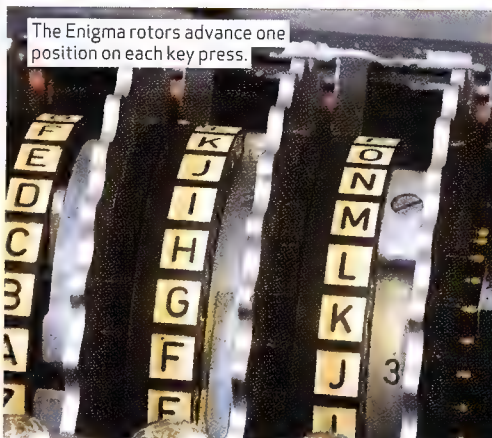
Learn more about Enigma – and how it was cracked

It's now common knowledge how Enigma was cracked by the cryptanalysts at the famed Bletchley Park establishment in Buckinghamshire, north of London, but 'Ultra' still had top-secret classification until the 1970s. The sixth part of the excellent 1970s BBC series *The Secret War* is devoted to Bletchley Park. The series itself is dated but still a terrific introduction into the scientific and technical advancements made during that period, featuring interviews with many of those involved at the time, including Colossus engineer Tommy Flowers. Search for 'The Secret War Still Secret' on YouTube.

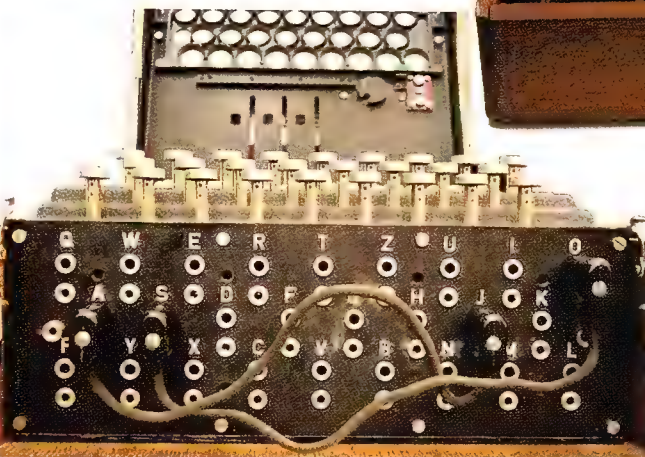
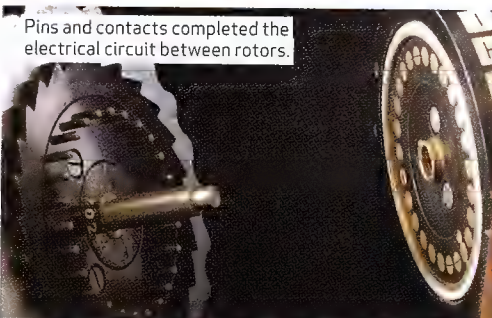
Cracking the Lorenz SZ40 led to the development of the first all-electronic computer called Colossus.



The Enigma rotors advance one position on each key press.



Pins and contacts completed the electrical circuit between rotors.



The Wehrmacht Enigma machine (army machines had three rotors).

The plugboard allowed the operator to swap pairs of keyboard letters.

to a different letter. Again, you enter a three-letter group for the three rotors. Finally, you set the plugboard – like the real Enigma, you can enter up to ten two-letter groups, each pair being the letters swapped (remember, don't repeat any letters).

At each point, you can choose to simply press the Enter key to select the default settings. Doing this for every option yields rotors I, II and III, start position 'AAA', ring position 'AAA' and no plugboard pairs. (The plugboard is optional). Now all you do is start typing in your plain text or encoded message – the last seven characters you type appear on the top line of the display, the encoded/decoded character underneath. Despite its seemingly slow 16MHz/8-bit processor, the Arduino Enigma is still incredibly quick and can encode/decode faster than you can type your message.

To mimic the real thing, once you start typing your message, you cannot go backwards since each key press advances the rotor. You can however press the reset button, re-entering the initial settings and start again.

GIVE IT A GO

You can only imagine what Alan Turing and Tommy Flowers would've made of an Arduino board. Even with its limited 16MHz/8-bit processing and 2KB RAM, an Arduino is capable of far more complex encryption than we're performing here. Sure, you can use one of the free online or Android apps to do the same thing, but hopefully, this project will give you a glimpse into the world of cryptography and more importantly, a feel for just what the cryptanalysts at Bletchley Park were able to achieve with far less technology.

Today, the Enigma machine is still being used – this time to inspire the next generation into studying maths and science through Cambridge University's The Enigma Project (enigma.maths.org). ■

Tutte and Flowers – the first computer's colossal story.

History rarely records the full story of events past and the story of computing is no different – in fact, it's been further impeded by the UK Official Secrets Act. Mathematician Alan Turing is rightly remembered for his work on breaking Enigma and developing the electromechanical 'bombers' that sped up the decrypting process, but his is only part of the story.

By 1941, the German High Command had bypassed Enigma for a new encryption machine, the Lorenz SZ40 'secrets writer', which made Enigma look like a toy. Whereas the Wehrmacht Enigma was a manual machine utilising three encoding rotors from a possible five, the SZ40 was an in-line, automatic 12-rotor teleprinter cipher machine – the operator typed in the plain text message, the machine encoded it automatically and transmitted it via radio. That transmission was received and decoded by another SZ40 at the other end, printing out the original plain text.

The job of cracking Lorenz fell to a young Bletchley Park mathematician, Bill Tutte. While Turing had the benefit of previous Enigma-codebreaking work by the Polish Cipher Bureau, Tutte had nothing to go on but the encoded messages themselves. That he and colleagues broke Lorenz by January 1942 is still considered one of the great mathematical feats. But breaking Lorenz by hand was too slow – the answer had to be another Turing Bombe-like machine. The first attempt called 'Heath Robinson' was aptly named for its complicated design, requiring two synchronised, looped punched-hole tapes to implement Tutte's solution. But the tape speed required to achieve even a modest 1,000 characters per second would often see tapes stretch out of sync or break.

An electrical engineer at Bletchley, Tommy Flowers, saw the machine and knew it could be improved using electronics. His superiors refused to believe it but undeterred, he pressed on, designing and building the first all-electronic programmable computer using 1,600 thermionic valves or 'tubes' – all out of his own pocket. 'Colossus' was completed in November 1943 and instantly began helping break the Lorenz code. Not only did it work, it only needed the one original message tape, allowing a five-fold speed increase over 'Heath Robinson'. Requests for more computers were made and with new refinements, Flowers finished the Colossus II on June 1, 1944, five days before D-Day. It included the first known use of what we now know as a 'shift register', speeding up processing to 25,000 characters a second. Colossus was instrumental in breaking messages Hitler believed unbreakable and is widely regarded as hastening the end of the war by as much as two years.

But as war ended, the 11 Colossus computers in existence, along with all schematics and documents, were ordered destroyed by British Prime Minister Winston Churchill; Tutte and Flowers were muzzled by the Official Secrets Act and their work never acknowledged.

It wasn't until the 1970s that word of their feats began to leak. Tutte was later made a Fellow of the Royal Society and despite the destroy-all-documents order, a replica of Flowers' Colossus computer now stands as a working exhibit in the National Museum of Computing at Bletchley Park.

If you watch nothing else today, make sure you search out the BBC documentary 'Code Breakers – Bletchley Park's Lost Heroes' at YouTube or elsewhere online.

Where to find the software

You'll find the software or 'sketch' for this project on our web site at apcmag.com/arduino.htm. Copy the contents of the libraries folder into your Arduino IDE's libraries folder and create a new project using the INO file, compile it and flash it to your Arduino Uno board. The software comes 'as is', with no warranty – it's been thoroughly tested but you use it at your own risk.

ARDUINO ENIGMA CIPHER MACHINE - PARTS LIST

COUNT	PART	COST	FROM
1	ARDUINO UNO R3 BOARD	\$15	EBAY, ONLINE SUPPLIERS
1	1602 LCD SHIELD	\$10	EBAY, ONLINE SUPPLIERS
1	130 X 68 X 44MM JIFFY BOX	\$4	JAYCAR ELECTRONICS
1	6-PIN MINI-DIN PANEL SOCKET	\$3	JAYCAR ELECTRONICS
1	MOMENTARY NO PUSHBUTTON SWITCH	\$2	JAYCAR ELECTRONICS
1	SPDT TOGGLE SWITCH	\$2	JAYCAR ELECTRONICS
1	2.1MM DC BULKHEAD SOCKET	\$3	JAYCAR ELECTRONICS
	MOUNTING HARDWARE (SCREWS ETC)	\$5	JAYCAR ELECTRONICS, BUNNINGS ETC
	TOTAL	\$44	

Android USB charging secrets

We all want our Android devices to charge faster.

Darren Yates reveals the secrets to maximising charging speeds.

Battery life is always the curse of any portable device, but with USB ports in plentiful supply, finding a power source isn't usually that difficult. However, USB charging is one of those 'dark arts' and just because you can see the charge light appear on your device, there's no guarantee you're getting anywhere near the maximum charge rate.

Over the last few months, we've been looking at Android kernel modifications. The kernel is the nerve centre of any operating system that keeps everything ticking over. But the default Android kernel is fairly well tied down by design to ensure you (or anyone else) can't damage or attack your device. But limitation is a dirty word to serious Android users and we've looked at a couple of kernel modification options including flashing a new kernel and incorporating the Xposed framework.

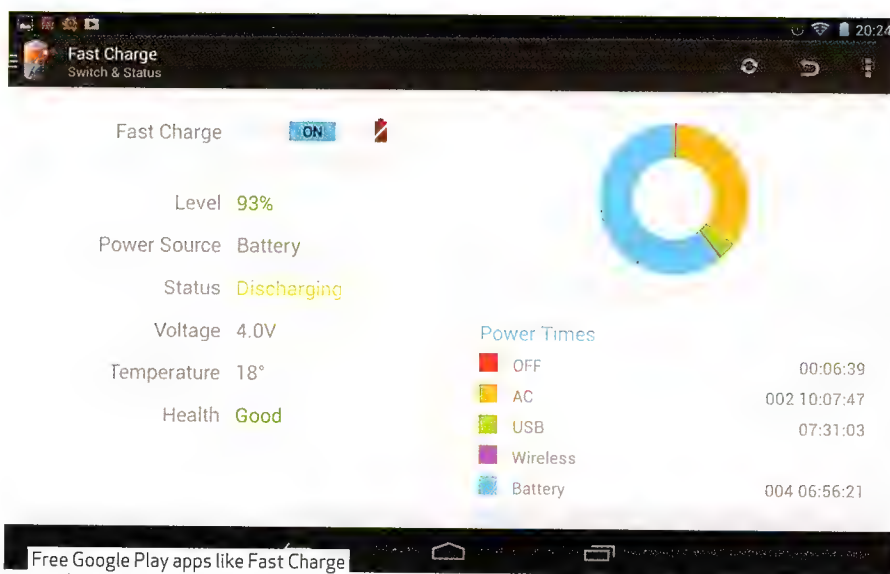
FAST CHARGE

We've waxed lyrical about how versatile Xposed is but as of time of writing, there's one feature Xposed doesn't offer that still requires a new custom kernel – and that's the idea of 'fast charging'. It doesn't appear in all kernels but it's the idea of speeding up battery charging via USB when connected to a PC or notebook. If you have root access and the right kernel, there are plenty of free apps on Google Play that will tap in and accelerate your charging speed. How? The custom kernel will have a 'fast charge' command module that can be toggled on or off via Terminal using the command:

```
echo 1 > /sys/kernel/fast_charge/force_fast_charge
```

Changing the '1' to '0' toggles it off again. XDA-developer faux123 extended this method by allowing you to also set the charge current. First, you run the above command but with '2' instead of '1', followed by:

```
echo "900" > /sys/kernel/
```



fast_charge/fast_charge_level

You can replace the '900' with 500, 900, 1200, 1500 or 2000 to represent the milliampere (mA) current level you want the charge level set to. Again, running the first command with '0' toggles the whole thing off and back to original condition.

UNDERSTANDING THE RISKS

But this hack comes with definite risks and you need to understand how USB charging works and what this hack actually does.

When you plug your Android device into a USB power source, an initial negotiation or 'handshake' occurs between the power source and your device – that's to provide your device with info on how the power source works and the charge current it can provide. USB ports of PCs and notebooks generally have a more limited capacity to supply current than a dedicated wall charger, so Android has two general charge level settings – 'USB' and 'AC'. The charge voltage is the same – 5VDC – but the initial negotiation tells the device which charge current rate setting to use. In practice, 'USB' typically sets the charge current rate maximum to 500mA,

whereas AC can set it anywhere between 500mA and 2000mA. Now obviously, if you can get your device charging at 2000mA, it's going to charge four times faster than if it's stuck at the 500mA level – but there's a lot more again to deciding that maximum rate.

The kernel hack forces Android to use the 'AC' charging mode, regardless of what type of port the device is connected to, effectively bypassing the negotiation and saying to the power source 'I'm taking whatever charge current I want!' – and that can have consequences.

WHAT ACTUALLY HAPPENS

To understand what's going down, a bit of 'electronics 101' will come in handy. A power source can supply electrical current up to a certain level – like water flowing from a pipe. Water can only flow at the rate determined by the diameter of the pipe and pressure behind the water. In electronics, that pressure is voltage and in USB charging, it's always fixed at 5VDC. The diameter of the pipe sets the maximum possible water flow rate or in our case, the charger's internal electronics sets the maximum charge current available. Ultimately, it's the

device to be charged that sets the charge rate – it decides how much current it wants from the power source. In properly designed tech, this charge level will be perfectly matched to an accompanying power source's capabilities, so everyone stays happy. But if the device tries to extract more current, that places excessive strain on the power source's electronics – depending on how excessive the demand is, it may well significantly damage the power source.

That initial negotiation between the device and the USB power source is all about these two working out the maximum available charge current the power source can safely supply without blowing up. How that negotiation happens is a science in itself.

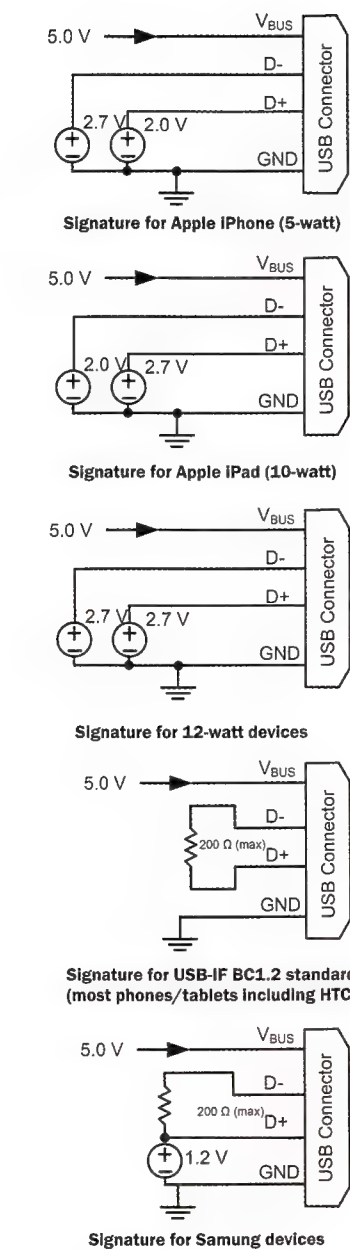
USB CHARGE STANDARDS

When the USB standard first arrived in the late-1990s, it was simply a serial data connection port – there was little thought for charging portable devices. The original USB 1.0 standard allowed up to 150mA of current to be pulled from the port; USB2.0 pushed that to 500mA and USB3.0 to 900mA – but that's from standard PC/notebook USB ports.

In 2007, a new USB Battery Charging Specification standard appeared, defining two new port types. While the standard USB port is known as a Standard Downstream Port (SDP), the two new types were the Charging Downstream Port (CDP) and the Dedicated Charging Port (DCP). A CDP transfers data like an SDP but can also supply up to 1500mA of current with standard negotiation. A DCP doesn't transfer data, but unlike other ports, can deliver 1500mA (or more) output without the hassle of negotiation.

HOW IT WORKS

Now here's where we get into device design – the USB ports on Android devices are typically handled by special-purpose chips made by brands such as Texas Instruments, Maxim, Microchip and ST Microelectronics. Because there are now multiple power



CDP USB ports use electrical signatures for various devices.

source specifications just in the USB standard alone, these chips have plenty of work to do. But it's further complicated by the negotiation techniques implemented by the various device manufacturers.

The basic USB port has four connections – Vcc (5VDC), GND (0VDC), Data+ (D+) and Data- (D-). These last two connections carry the data to and from your device to your PC, external storage or whatever you connect. Electrically, they form what's known as a 'complementary pair' – whatever digital signal is on one line, the opposite appears on the other. This is to help reduce electrical interference and maintain maximum data speed. But they're also the primary location for charge rate negotiations.



Apple's iPhone introduced electrical signature detection for USB charging.

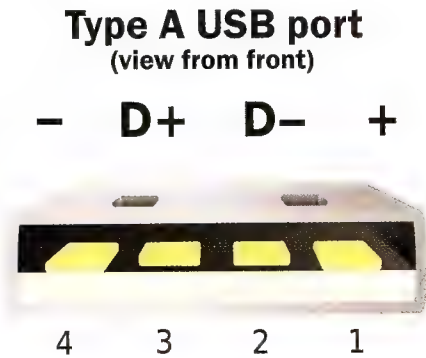


The Apple USB charger supports resistive sensing to set charge rates.

DIFFERENT MANUFACTURER STANDARDS

But device makers being a competitive lot, there's no one standard negotiation – it's a bit like having to speak six languages. Apple started it with the iPhone – since the original USB specification had no standard for high-speed battery charging, Apple came up with its own 'electrical signature'. It decided that if an iPhone or iPad came up against a USB port with 2.0VDC on the D+ line and 2.7VDC on the D- line, that port would be an Apple iPhone (DCP) charger that could supply 1000mA of current. If the voltages were reversed (2.7V/2.0V on the D+/D- lines), it'd be an iPad charger with 2000mA maximum supply.

But it didn't end there. While the



Type-A USB ports have four wires, D+ and D- setting the charge current.

USB forum released a generic 'signature' standard, other manufacturers came up with their own signatures and in the end, there are at least six D+/D- signatures in the wild:

- 2.0V/2.0V - low power (500mA)
- 2.0V/2.7V - Apple iPhone (1000mA/5-watt)
- 2.7V/2.0V - Apple iPad (2100mA/10-watt)
- 2.7V/2.7V - 12-watt (2400mA, possibly used by BlackBerry)
- D+/D- shorted together - USB-IF BC 1.2 standard
- 1.2V/1.2V - Samsung devices

These days, resistance-based voltage sensing options like the first four are described as legacy modes and all new devices we believe use chip-based detection. However, with millions of legacy devices (and even more AC chargers) in the wild, they still have to be accounted for. Chips like Texas Instruments' TSP2514 and TSP2543, Microchip's USB2534 and ST Microelectronics STCC5011 all handle these various signature combos.

IN PRACTICE

Hopefully, you can see there is this 'nightmare of negotiation' that has to be navigated in order to reach the highest charge rates. As we said before, it's your device that practically determines the charge rate, even if the power source has more to give. That's why for example, an iPhone will only charge at 1000mA even if it's connected to a 2100mA iPad charger. But it's also why an iPad will only take 1000mA from an Apple iPhone charger instead of its preferred 2100mA.

But while Apple devices have specific cables and chargers to help ensure those rates, Android devices typically use the generic microUSB port connection and connect to a myriad of USB chargers.



MicroUSB ports are convenient but can't guarantee full charge rates.

Charge current will automatically drop

Don't forget that Lithium-ion/polymer based batteries reach their maximum charge rate between 5% and 80% of capacity — above 80% and the charge current begins to automatically drop, so make sure your device's battery is at around half-capacity before you begin testing for charge modes.

THE SECRET

And this is where the whole idea of maximum charge rates tends to come crashing down in a screaming heap. Unless the third-party charger has a proper controller chip or at least the right basic signature, there can be no negotiation between the device and power source, which means the device must fall back to a default charge current, typically 500mA — even if the power source can supply more.

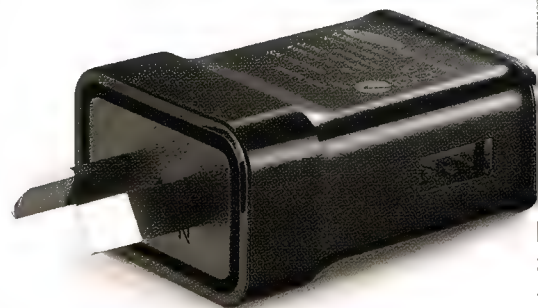
What's more, the signature voltage specifications are typically quite tight so if they're a little bit out of spec, the signature won't be detected and again, a lower fall-back charge current used. And this is where USB cable quality now comes into play. You might well be able to find a cheap replacement USB cable online, but there can be two major problems. The first is by using light-gauge wire, a cheap cable may alter signature voltage, possibly enough to push it outside of specification and detection. The other issue is the light wire gauge will also see greater power losses, meaning your device can't charge at maximum speed anyway.



Samsung uses its own voltage sensing signature for USB charging.



My in-line USB monitor alters D+/D- pins, connects a digital multimeter.

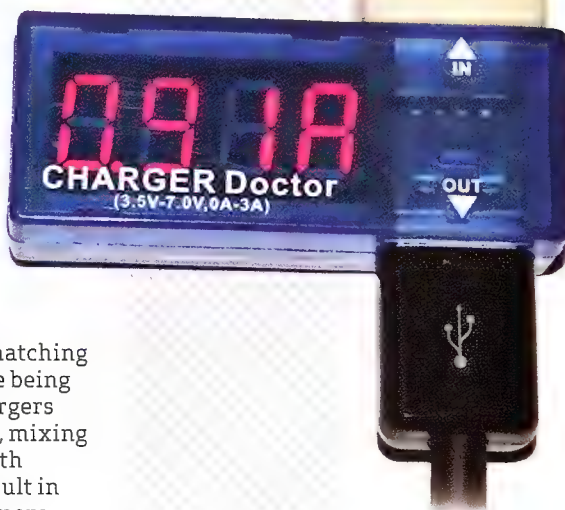


Use the original supplied power brick for maximum charge rates.



This USB monitor has 1% accuracy, perfect for checking charge rates.

The USB monitor measures voltage and current up to 3000mA.



So, in the end, there are three areas where USB charging can be adversely affected – the USB port standard used (SDP, CDP or DCP), electrical signature mismatching and the quality of the USB cable being used. And since not all USB chargers are built to the same standards, mixing and matching your chargers with different devices could well result in slower charge rates, requiring more time for your device to charge.

Bottom line, unless you get all three areas sorted out, you cannot reach maximum charging speeds.

TESTING CHARGE CURRENTS

While there are software ways of monitoring power draw through SDP USB ports (Windows, for example, can display this in Device Manager), the only way you can test DCP chargers is with what's called 'inline testing' and there are two ways you can do it. The first is by building your own test rig that enables you to insert a digital multimeter with a high current range in series with the Vcc supply rail – and that's what I've done. The other is a dedicated USB power monitoring device – you can find cheap models for under \$3 on eBay that measure volts between 3-7VDC and current between 0-3000mA (3-amps). Now you're probably thinking you can't expect brilliant accuracy for just \$3, but the device we've shown is still rated at around 1% accuracy – and for this exercise, that's more than you'll need. You just need something good enough to show you which charge mode you're in, whether it's nominally 500mA, 1000mA or 2100mA depending on your charge port and your Android device. It'll also show you the difference between a good and poor-quality USB charge cable. These monitoring devices are easy to use too – you plug in your charge cable into one side and the other side plugs into the USB charge port or charger. The display alternates every



Not all MicroUSB cables are the same quality so choose wisely.

Learn more about USB charging standards

If you want to know more about how USB device charging works, you can read these white papers and datasheets:

- USB-IF Battery Charging Specification Revision 1.2 — www.usb.org/developers/devclass_docs/BCv1.2_070312.zip
- Microchip Application Note 26.19 — ww1.microchip.com/downloads/en/AppNotes/en567019.pdf
- ST Microelectronics STCC5011 USB Charging Controller — tinyurl.com/stmuscharge
- Texas Instrument TPS2514 USB Dedicated Charging Port Controller — www.ti.com/product/tps2514
- Texas Instrument TPS2543 USB Charging Port and Power Switch Controller — www.ti.com/lit/ds/slvsba6/slvsba6.pdf

OPERATING MODES

PORT TYPE	USB DATA TRANSFER	MAX. ALLOWABLE CURRENT DRAW (mA)	NEGOTIATION REQUIRED
SDP (USB 2.0)	YES	500	YES
SDP (USB 3.0)	YES	900	YES
CDP	YES	1500	YES
DCP	NO	1500	NO

few seconds between voltage and current, measured in volts and amps, respectively.

IT'S UP TO YOU!

USB charging is a minefield of official and proprietary standards, all mashed together with a mind-blowing array of ports, chargers and cables. Ultimately, you cannot make your device charge

any faster than the maximum rate it supports – whether you have the correct charger or a small nuclear power station, your Android device will have its own limit and that's that. However, you can positively affect the charge rate by ensuring you understand how USB charging works and making sure you're using the right gear to start with. ■

Create a Pi-powered retro gaming box

Use a Raspberry Pi to relive your misspent youth and emulate the golden era of 1980s home computer gaming.

There are many fine national institutions this country has to offer: fish and chips at the beach, the Sydney harbour bridge, the Great Barrier Reef and Uluru to name but a few. There is one institution, however, that stands proud, shoulder to shoulder with the iconic monuments that make Australia great. One that has bred a generation of imaginative free thinkers. One that symbolises everything that was good 'back in the day'. That one is none other than the mighty 8-bit home computing revolution. These revolutionary creations were the heavyweight champions of 80s gaming, and some of the most cherished items of computing memorabilia to grace the pages of eBay.

To relive those bygone days often requires us to install any number of emulators on our hulking behemoth PCs, which takes away some of the spirit that embodies the golden age of the home computer. There's another option, of course; we could purchase one of our beloved machines from eBay and hook it up to a 52-inch plasma TV. However, these computers are getting a bit long in the tooth, and unless they've been cherished and looked after, they could go zap and pop once plugged into the wall.

There is another way; one that combines the modern with the not-so-modern. The Raspberry Pi – arguably one of the best innovations since the home computer, and one that is heralding a new golden era of computing. This credit-card-sized computer is seeing its fair share of imaginative doings from the public: being sent to the edges of space, turned into a 40s wireless set, home automation controllers and many other projects that have gone to prove just how versatile the users, and the RPi, can be.

Therefore, we're going to take a leaf from their books, and see what we can do with a few items from eBay, a Raspberry Pi, sticky-backed plastic and help from the growing population of RPi owners, in order to help us re-create a classic 80s retro home computer.

ZX/Pi

Our first port of call is that lovable rubber-keyboarded gem, popularly known as the Speccy. Indeed, the ZX Spectrum 48k was a powerhouse of innovation back in its day, turning bedroom programmers into commercial software giants overnight, when teenagers could come home from school and tap away until dinner time to create some of the best-loved games in computing history.

Anyway, enough nostalgia as it's bringing a tear to the eye. After a brief browse through the pages of eBay, we found a dead ZX Spectrum that came in at the paltry sum of \$4.99 – after all, it would be sacrilegious to mutilate a living Speccy. It looked a little worse for wear, but then most of us who can recall playing on one of these don't look overly healthy these days either.

Our first task was to make sure the

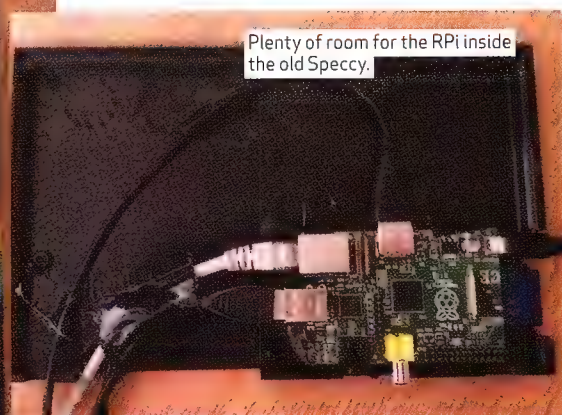
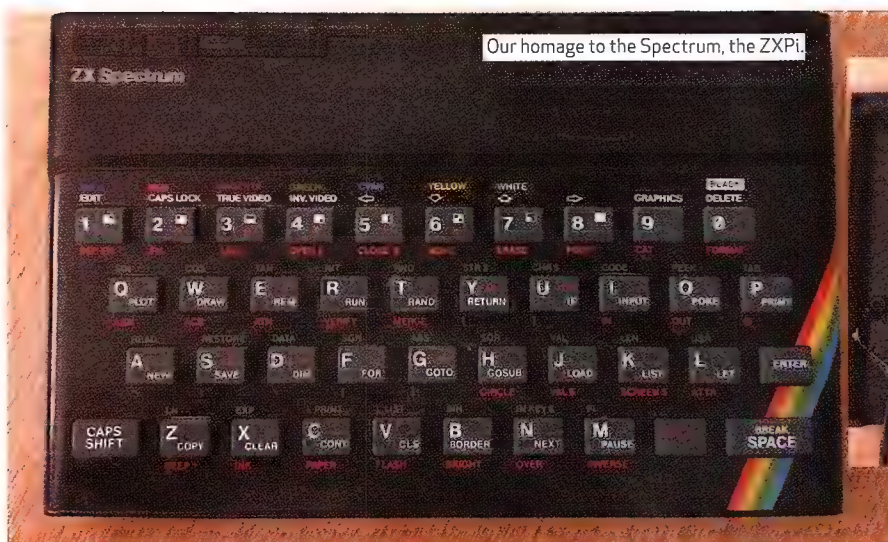


The mighty ZX Spectrum. Gawd bless it!



The ZX Spectrum innards, ready to be removed.

RPi was up to spec; we'd been playing around with it since its arrival in the post, and as things move fast in the world of Pi, we felt it was time to do an upgrade to Wheezy. The system download can be found on the Raspberry Pi pages, www.raspberrypi.org/downloads/, along with full

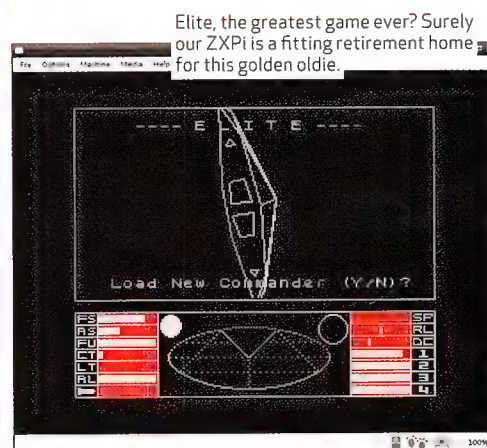
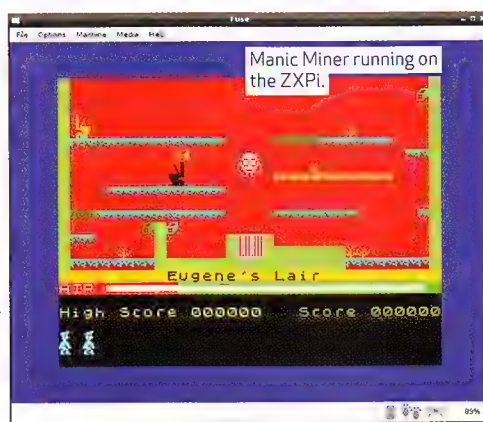


instructions on how to transfer it to an SD card, and get it up and running. After that, we did the necessary `sudo apt-get update/upgrade`, and within minutes our RPi was up to date and running like a charm.

Next came the dismantling of the ZX Spectrum, easy enough once the five screws on the bottom of the machine had been removed and the keyboard ribbons detached. The motherboard had a single central screw, which after being removed left only the bare plastic casing.

The RPi is considerably smaller than the original Spectrum motherboard, so some careful placement was needed to make sure the RPi was situated conveniently and securely within its new housing. To that end, we found that the RPi's RCA Video and Audio ports lined up nicely with the Spectrum's original Mic and Ear ports, but the RPi's SD card ran into the side of the plastic casing. A quick snip from the pliers made a slot that would allow us to swap SD cards, even when the case was screwed back together, and extending the homemade slot also gave us access to the power input via an HTC charger.

Next, we hooked up the HDMI and Ethernet, and with the help of some ever-faithful black electrician's tape, we secured the RPi to the base of the Spectrum case, and taped the cables to the chassis to stop them from ripping the RPi out of its allotted place should they ever be moved. Now we had the problem of the keyboard. Although there was a previous project, whereby a chap called Brian rebuilt a ZX Spectrum using a BeagleBoard, and successfully managed to get the keyboard working (see tinyurl.com/mu8oktd), our attempts fell somewhat short. In other words, we failed



miserably, making a bit of a mess of the keyboard ribbons and the USB interface we shanghaied from a USB keyboard for just the purpose. Still, never mind, we simply caved in and ran a traditional keyboard and mouse through the Spectrum's large IO port.

Once the case was back on, the ZXRPi didn't look too bad, albeit something that would send Heath Robinson spinning in his grave. However, when hooked up to the TV and stylishly, yet discreetly, placed in the TV cabinet, things didn't look too bad. The only thing left now was to install a decent Spectrum emulator and get hold of some old games. The Spectrum emulator itself was easy enough to install and get running; for this project we're using Fuse Emulator, and to get it working do the following:

Drop into a terminal and type:

```
sudo apt-get install fuse-emulator-common
```

and press Enter. Type, y to confirm the download and install. Once Fuse has been installed, and you are returned to the prompt, type the following and press Enter:

```
sudo apt-get install
```

```
spectrum-roms fuse-emulator-
utils
```

When, once again, you return to the prompt, type in:

```
sudo amixer cset numid=3 2
```

and press Enter.

This will allow the sound through HDMI, although it's rather flaky, so replacing the 2 with a 1 will force the sound through the audio port on the RPi.

When you're ready, come out of the terminal, and click the 'Start LXDE' button, and navigate to 'Games > Fuse Spectrum Emulator (GTK+ Version)'. Click on this and expand the window by dragging one of the corners.

Next, download a Spectrum game, from somewhere such as World of Spectrum (tinyurl.com/y2b36t); once it's downloaded, from the Fuse top menu select 'Media > Tape > Open', then in the Spectrum window type J for Load, followed by Ctrl-PP for ". Your game should now load, with sound coming from the audio port, which can be hooked up to a stereo or headphones. All that's left is to try to complete Manic Miner, which you failed at nearly 30 years ago.

MEGA!PI

The thought of having a retro-styled case for our Raspberry Pi appealed to us greatly, despite the lack of hardware hacking to get 100% functionality, so we started to look around for other retro machines that tickled our fancy.

Our attention was drawn to an old friend, the Sega Mega Drive; a sleek-looking unit, even by today's standards, that like the Spectrum would make an ideal retro case for our RPi. First, though, we need to prepare the RPi for its new life inside one of the best consoles ever made; and we want it to be able to play not only Sega Mega Drive games, but a plethora of other games from the hardware of the era.

To do this, we installed the excellent RetroPie project from petRockBlog; all you need to do is follow the instructions as they are given at tinyurl.com/kkmvfgc. In this instance, we decided to compile the most recent sources of programs, scripts and cores by selecting the second option from the main menu, the Source-based (custom) installation method. As mentioned on the site, it takes several hours to compile everything, and the RPi is pretty much maxed out for the entire time, so don't expect it to do any work during the three hours of the installation; but bear with it, it's certainly worth the wait. Once the installation had finished, the RPi got a well-deserved break in the form of a reboot. After that, it was a simple case of locating a game (we're assuming you're following the copyright guideline, below) and running it, via a terminal, in this format:

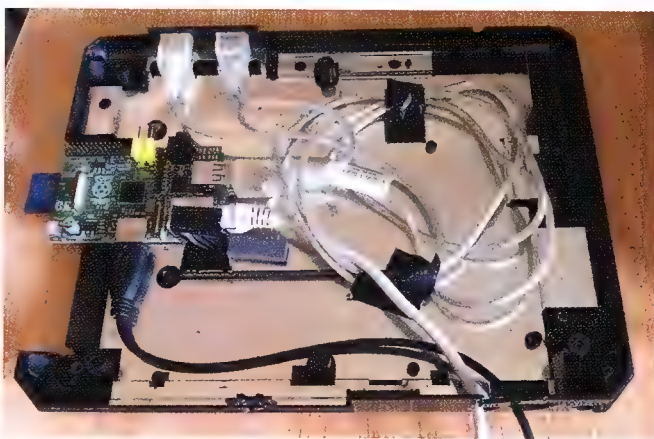
```
retroarch -L /home/pi/RetroPie/emulatorcores/Genesis-Plus-GX/libreto.so /home/pi/RetroPie/roms/megadrive/Sonic.md
```

In the example above, we had a *Sonic the Hedgehog* ROM, located in the roms folder under 'megadrive'. Obviously, you will have to alter the

command to represent your machine emulation, and the game you're planning on playing.

Picking up a dead Mega Drive was easy enough, and it cost less than a few

bucks to get it to the doorstep; but rather than rip out the insides straight away, we had another cunning plan: would it be possible to house the Raspberry Pi inside the cartridge of a



It fitted in nicely, but the cable management would be an issue.

The RPi in the Mega Drive – plenty of room, and we recycled the USB ports in the front of the console.



Add a games cartridge, and we have a fantastic looking retro case for the Raspberry Pi.

A well-known blue hedgehog running on the Raspberry Pi.

The legal bit

The legality of emulation is something of a grey area at the best of times, but in essence, if you own the console, and game, then you are allowed to obtain a copy of the corresponding ROMs to emulate them. At least that's what we think. If you're not sure, it's always best to look it up, just in case.



Sega Mega Drive game? The Mega Drive we received was a little worse for wear; since its birth in 1992, it has seen its fair share of action, so although it was rough, we thought this just added to its retro charm.

Obviously, the game would have to be Sonic, and once we got an old *Sonic the Hedgehog* cartridge, it looked as though it may be possible to squeeze the RPi into its innards. Indeed, the RPi does fit into a Mega Drive games cartridge, but it leaves very little room for cable management, even with sections of the cartridge plastic snipped away to accommodate the SD card. So, rather than having a savagely hashed cartridge atop the Mega Drive, with a tangle of cables, we decided to install the RPi within the body of the Mega Drive, and use what items we had lying around to try to keep some functionality from the original console.

We planted the RPi on to the Mega Drive base, with the SD card within easy reach through the side expansion port, which can be sealed with the plastic cover, and ran two USB extension cables from the RPi, and fitted them into the front gamepad controller ports. The HDMI and Ethernet cables were pushed through the power and TV ports at the rear of the unit, and the power came via the side expansion.

After making sure everything was battened down, and that the Raspberry Pi wasn't in any danger of sliding out of the side of the case, we started to feed the necessary cables through the correct holes. We carefully attached the lid of the Mega Drive, making sure the screws didn't catch any of the cables or the RPi itself, slid it into its new home under the TV, and fed the now reconditioned MegaPi some power. Obviously, the power and volume controls at the front of the console didn't work, but they added to the retro appeal of having a 90s console, with a modern spin. Our MegaPi functioned perfectly, and we settled in for an evening of Mega Drive classics, via the Genesis emulator in RetroPie.

WINPI

Our next software project bordered on the perverse, from the point of view of a Linux-based article. We managed to get DOS 6.22 and Windows 3.1 running under QEMU on the RPi.

Rather than building the image from within QEMU, we used a pre-built VirtualBox image, which we converted to a raw IMG file by issuing the following command:

```
vboxmanage clonehd "image.vdi" "image.img" --format RAW
```

Replace image.vdi and image.img

Other retro ideas

To help you kick-start your retro RPi project, here are a few ideas for you to mull over:

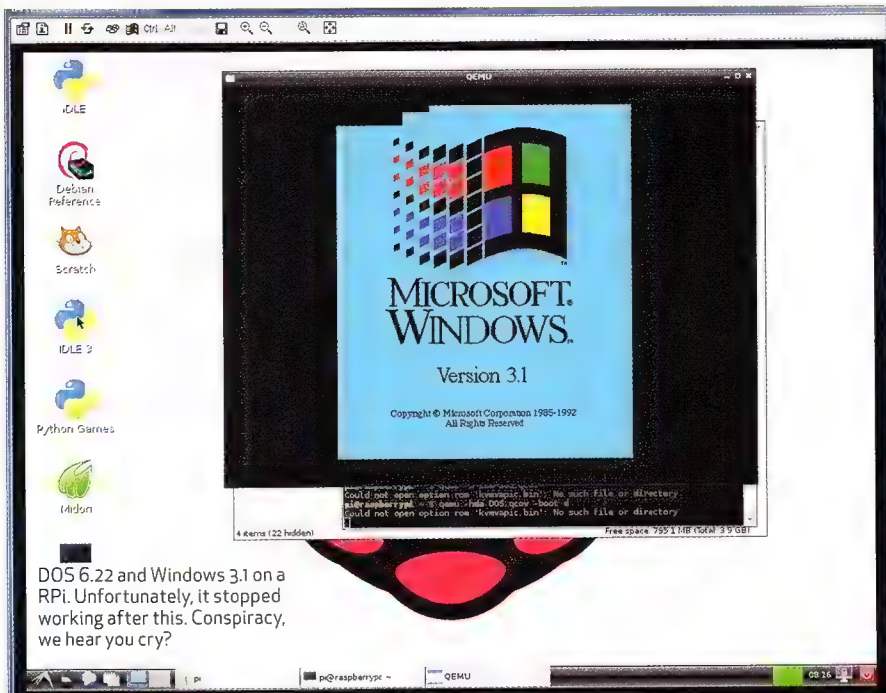
- **C64Pi** Convert an old Commodore 64, and have it boot into the Commodore OS.
- **MasterPi** As with the Mega Drive, try the same on a Sega Master System.
- **AtariPi** Get hold of an old Atari system and work your magic.
- **Spectrum+2** Recall the Spectrum+2 with the built-in tape drive? We think a Pi could fit in there...
- **KeyboardPi** Find an old DIN socket keyboard, and see if it's possible to build an RPi into it.

Over to you

Creating a retro case for our Raspberry Pi was great fun, albeit an amateur attempt. We already know that you, the reader, are more than talented enough to roll up your sleeves and get your hands dirty with a soldering iron and a set of pliers; so how about you showing off your hardware hacks involving the tasty Pi? Perhaps you could figure out how to include some of the original hardware elements of a retro computer, or console, in the Raspberry Pi's workings?

Whatever Raspberry Pi projects you have on the go, why not write in and let us know? Include some images and a step by step so others can follow where you lead. Either way, have fun! apcmag@futurenet.com

"Needless to say, it ran like a pig in treacle as the RPi hasn't got a whole lot of RAM!"



with the name of your images, then convert the raw image to a QEMU qcow image by typing in:

```
qemu-img convert -f raw image.img -O qcow2 image.qcow
```

The result was extraordinary, and oddly satisfying to see Windows 3.1 start and hear those 'ta-da' chimes.

Needless to say, it ran like a pig in treacle as the RPi hasn't got a whole lot of RAM, and after several minutes of running Microsoft's retro OS, the screen froze and QEMU refused to boot the image until we deleted and re-converted it. Perhaps Eben's team coded in some kind of Microsoft failsafe kill switch? ■

drawtime

» GAMES - EDITED BY TROY COLEMAN

✓✓✓
apc
RECOMMENDS

My aim's a little off-centre, but it doesn't seem to matter at the end of the day.



FROM \$79 | PC, XBOX 360, XBOX ONE, PS3, PS4 | WWW.WOLFENSTEIN.COM

Wolfenstein: The New Order

Loud, violent, and smarter than you might think.

Bethesda title *Wolfenstein: The New Order* has been made with love. This might not be obvious to you when you are giving a Nazi both barrels as the world around you collapses in a shower of bone and blood and concrete. I would forgive you for missing this care and attention to detail when you wrench a lasergun from its fixed emplacement and use it to mulch a charging column of Third Reich roboguy.

But it is there if you go looking for it. This vision of Nazi-dominated 1960s Europe has been constructed with extraordinary style. *The New Order* is *Inglorious Basterds* by way of

Moonbase Alpha – an X-rated episode of *Captain Scarlet* starring the world's most heavily militarised jacket potato.

BJ Blazkowicz returns during a last-ditch Allied assault on a Nazi compound in 1946. This game is technically a sequel to Raven's 2009 *Wolfenstein*, but all you really need to know is that the Nazis have somehow figured out how to graft a gigantic staple remover onto a dog's face. Advances like this one have given them the edge, and BJ is left in a 14-year coma when that final assault goes south. He wakes up in a world controlled by the Third Reich and becomes the cornerstone of a resistance movement.

History is treated like a

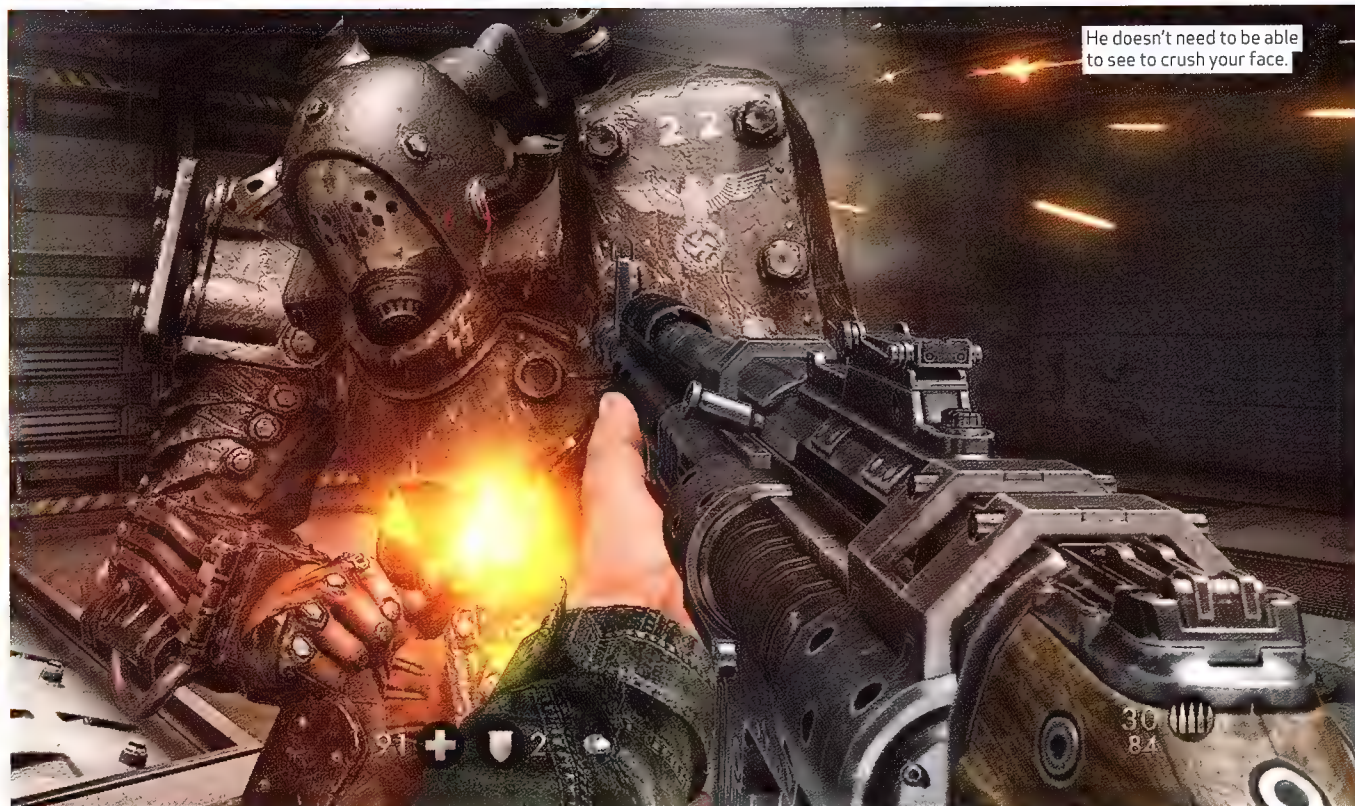
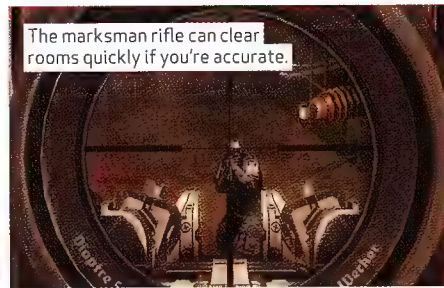
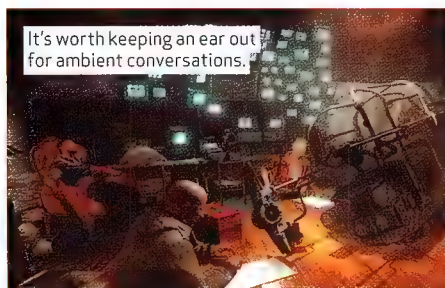
toybox when it comes to providing you with evils to revolt against. *The New Order's* basic thesis is that this is OK: concentration camps, secret police and brutal eugenics can be used as motivators for violent entertainment. If these ideas make you uncomfortable, or if you are otherwise disturbed by body horror, scalpels or surgery, it might be best to stay away.

COULD BE WURST

For all that brutality, though, this is a far more thoughtfully written and well-acted game than it has any right to be. It's never explicitly ironic – that would get tiresome – but its characters are intelligent, larger-than-life and

invested in the world around them. You'll periodically return to the resistance HQ for some non-combat missions, and well-written backmatter makes this space well worth exploring.

There are exceptions, of course – stock situations, stock characters and heroic sacrifices that you see coming hours in advance. This game does not deserve to be put on a pedestal for its presentation of history – unless that pedestal also includes a pair of thundering megashotguns and a Nazi who doesn't have arms any more. But it's better than you'd expect, and I pressed eagerly through the campaign's eight to



nine hour running time and would do so again.

An array of collectibles and difficulty modes encourage a second run, which is a welcome inclusion for a singleplayer game. Machine Games have invested a remarkable amount of time in this optional material: the game includes collectible recordings of '50s and '60s pop songs in their alternate universe... German language versions. Plus, a decision you make in the prologue has an influence on the campaign: you'll either be able to pick locks or hotwire devices depending on your choice, granting you access to different routes and upgrade paths. It's also – and here's the important bit – a very good shooter. Weapons have tremendous weight, animation is top-quality, and levels are

divided up into arenas that are, in the main instance, fun to fight across.

Major encounters normally include one or two commanders who will continuously summon reinforcements to the area if they're alerted. If you play *The New Order* as a straight shooter, enemies will continue to arrive until you fight your way through to the commander and successfully kill him.

The best thing about *The New Order* as a stealth game, though, is that it's fun to fail: fumble a takedown and you transition seamlessly into *Rambo*. I found myself adopting an all-or-nothing playstyle, going in quiet at first before gleefully transitioning to the double shotguns.

BJ picks up an upgradable laser cutter that can be used to carve freeform

shapes out of certain fences and vent covers, but beyond a few puzzles its potential goes unexplored. The laser should be *Wolfenstein's* gravity gun, but it's really just another gun.

HISTORY REPEATING

The game is further held back by a lack of new ideas in its second half. It remains a very good shooter, but the underlying structure never escapes familiar patterns. I've also got a gripe with its damage indicators – it's often quite tricky to tell when you're being attacked from the sides or behind; as enemy numbers ramp up this can lead to some unfair-feeling failures at higher difficulties. The AI's love of flanking manoeuvres is laudable, but a bit of warning would be nice.

At the time of writing, the game has driver

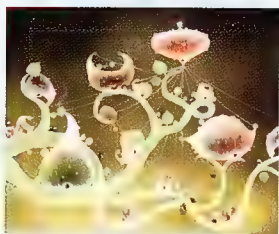
compatibility issues that impact performance. A bit of Googling should turn up a solution – either upgrading or downgrading your drivers, normally – but it's a hindrance, as is the abundance of texture pop-in that occurs just after you load a fresh game.

That said, the game is great fun to play. It really is a pleasant surprise and a reminder of a time when a shooter's singleplayer campaign was the main event – a time when titles of this genre were made with attention to detail, care and a bit of love. ■ Chris Thursten

Verdict

You can blow a Nazi to pieces among some lovingly-designed 1960s soft furnishings.



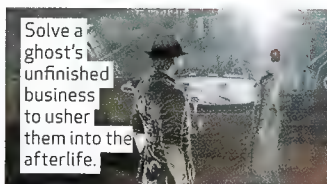


Botanicula

An achingly adorable little adventure that really grows on you.

\$3.79 | IOS (IPAD)
AMANITA-DESIGN.NET

The last iOS adventure game from Amanita Design was the lovely *Machinarium*, starring a sweet robot in a beautiful hand-drawn, robot-run world. It was fun and adorable, but compared to *Botanicula*, it might as well have been a gritty drama. *Botanicula* takes place in the world of plants, and stars a group of flora friends. When nasty creatures start draining the life out of plants, they set out to escape, but this isn't really about the plot. Each part of the game is filled with increasingly surreal puzzles and gentle maze-like environments to explore, which vary from tree branches to root systems to villages inhabited by sentient chestnuts. To complete an area, you might have to rescue chestnut babies, collect keys or find chickens. Finding these things might mean outsmarting a territorial scorpion, directing water jets to make plants grow, beating a chestnut at volleyball or bouncing off raspberry-like bugs. It's all totally mad, and brilliant for it, especially with the wonderful sound design and voices that have gone into every creature. There's a downside to bizarreness, though, which is it can be very difficult at times. This isn't a problem very often, but it does mean kids might need a bit of help with a game that's otherwise largely as perfect for them as it is for adults — utterly charming, endlessly inventive, silly and refreshing. ■ **Matt Bolton**



Solve a ghost's unfinished business to usher them into the afterlife.



Executing demons trivialises stealth sections.



Help living allies with stealth by messing with printers.



The sound you hear is church bells. This is not a puzzle.

FROM \$68 | PC, XBOX 360, XBOX ONE, PS3, PS4 | WWW.MURDERED.COM

Murdered: Soul Suspect

A lifeless game about a lifeless detective.

You're a detective, Ronan O'Connor, who is killed in the game's opening moments. As a ghost, you use spectral powers to investigate crime scenes in the hopes of solving your own murder.

It's a great premise, but one that *Murdered: Soul Suspect* is singularly incapable of living up to. Not only does it fail to present a satisfying mystery to solve, but its ghostly high concept hinders the experience rather than enhancing it. You can listen to everybody's thoughts, yes, but few characters have more than two of these.

You can use a poltergeist ability to trigger electronic items in the environment — phones, coffee machines and so on. These are used to create distractions for an ally during certain escape sequences, but otherwise they don't do anything.

The vast majority of your time will be spent clicking on collectible items while walking between your investigations. Newspaper clippings and hidden notes provide background information on Ronan, his killer, and the world they occupy, but none of this

information can be used to further the investigation itself. These documents are there to pad out a full-price game with no replay value that can be comfortably finished in six hours.

Murdered has a handful of stealth encounters where you have to evade patrolling demons, but these are undercooked. Enemies will barely respond to you as long as you're behind them, from which position you can quickly execute them with a quicktime event and if you're being chased, it's often easier to do a checkpoint dash.

INSUBSTANTIAL

My biggest disappointment with the game, however, are the investigations themselves. In these sequences you must search for clues and use this information to trigger actions or recollections from the NPCs you possess. Then, by selecting the most relevant clues, you unlock the next cutscene and the game continues.

As long as you click on everything and pick the most obvious answers to every question you'll never go wrong. Whenever I encountered problems, it was

normally because of misleading descriptions or arbitrary distinctions. If you're asked to identify a sound, for example, and you can hear a branch cracking, do you choose 'branch' or 'crack'? You have both options. They're both right, but the game will only accept one of them. *Murdered's* didactic deduction puzzles completely fail to account for ambiguity in language or intent, key factors in any process of investigation in the real world.

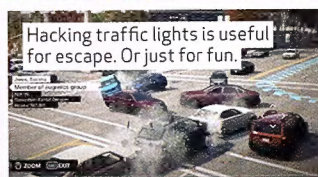
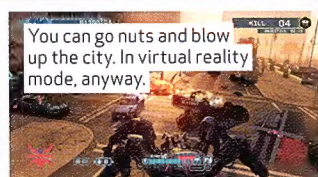
It's difficult not to get ahead of *Murdered: Soul Suspect's* flatlining difficulty curve. I'd figured out the killer's motive — an ostensibly unsolvable, game-spanning mystery — by about an hour and a half in, just as anybody who pays attention will be able to.

The plot gets more interesting at the very end, but by this point your interaction is limited to running and trial-and-error quicktime events. ■ **Chris Thursten**

Verdict

Lacking in meaningful challenge, it fails to deliver on its promising premise at every step.





FROM \$89 | PC, XBOX 360, XBOX ONE, PS3, PS4 | WATCHDOGS.UBI.COM

Watch Dogs

This has hard drives to hack and hard cars to drive.

There's no shortage of the familiar in Ubisoft's third-person open-world action game *Watch Dogs*, beginning with its moody protagonist, Aiden Pearce.

He's got a few days of beard stubble, speaks in a whispery growl, and has zero sense of humour. He's haunted by, and feels responsible for, a tragedy in his past, and he's out for revenge — or is it redemption? To find those responsible for his misery, Aiden needs to uncover a shadowy conspiracy involving secret organisations, organised crime, and government corruption, and will employ the help of — get this — an eccentric cast of oddball characters, some with secrets of their own. There is one new and interesting thing about Aiden: he's got a really cool phone.

There are a lot of issues with *Watch Dogs*, but Aiden's phone is due a lot of credit. In profile mode, the phone identifies nearby citizens and enables players to hack into their phones with a keypress, downloading bank information and eavesdropping on their calls. It's also connected to ctOS,

an omnipresent computer network that manages the entire city of Chicago so Aiden can change traffic lights to cause accidents, trigger explosions, raise barricades and tyre spikes, disrupt radio transmissions, cause massive blackouts and disable helicopters.

Where the smartphone truly shines is during infiltration sections where it can be used to hack into external security cameras and scout the area.

Remote hacking and camera trickery gets you into a lot of places, but many missions require a personal touch, by which I mean stealthily sneaking through buildings, shooting a thousand men in the face and driving at top speed all over the city. Aiden is gifted in the ways of parkour and silent takedowns, not unlike some assassins I could name.

The gunplay was mostly satisfying: mouse-aiming felt natural without being too easy, the bigger guns had a reasonable amount of recoil, and the single-shot grenade launcher got me out of plenty of jams.

Chicago itself feels a bit bigger than *GTA IV*'s Liberty City, and the areas are all

seamlessly connected (the only loading screens are while fast-travelling).

There's also plenty of extra work in *Watch Dogs* for the eager vigilante with notifications alerting you to optional (but plentiful) side-missions in the area.

The multiplayer is a bit of a troll-fest, where other players invade your game (or vice-versa) and hack your data. You need to locate them and kill them before the hack completes. Thematically, it's perfect, and it's especially fun when you're the invader.

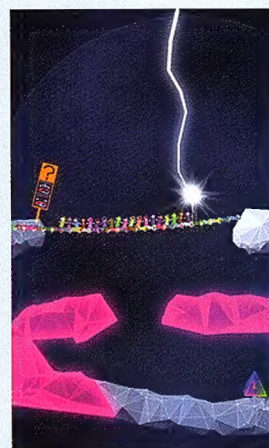
There is little to like in *Watch Dogs*' story. Aiden's gloominess and introspection are tiresome, and the best character, a fixer named Jordi, disappointingly gets almost no screen time.

Watch Dogs can seem like a game we've played before. But when it deviates from the familiar, it really soars and becomes a welcome thrill.

■ Christopher Livingston

Verdict

Creative hacking and covert multiplayer brings exciting life to a familiar open-world experience.



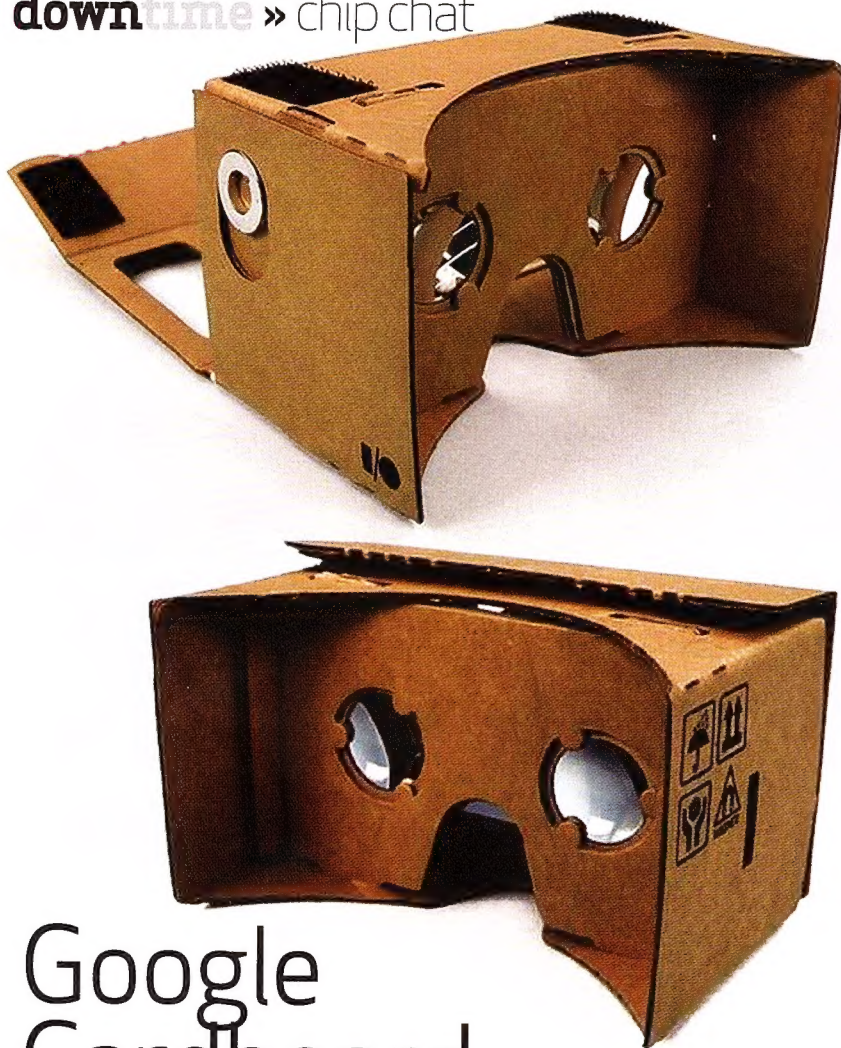
Kiwanuka

Suspense and bridges.

FROM \$2.49
ANDROID, IOS
CMAMEGACORP.COM

The aim of each level in this slight puzzler is to get your staff-wielding character across the level's 2D platforms to reach another of your people, trapped in a pyramid. You can walk side to side and drop down, but you can't jump, so any big distances must be traversed by forming bridges from, erm, your fellow people. By building towers of people and then swinging them across the level, you can dodge dangerous areas and reach the end. To no one's surprise, later levels require precise timing and lateral thinking to find the right routes for bridges. The thing is, it never develops beyond this, and experienced puzzlers will be done in a few hours. It's still worth buying — it's great fun, and presented impeccably (especially the whoosh of a bridge falling) — we just expected more mechanics and limitations to flesh it out over time.

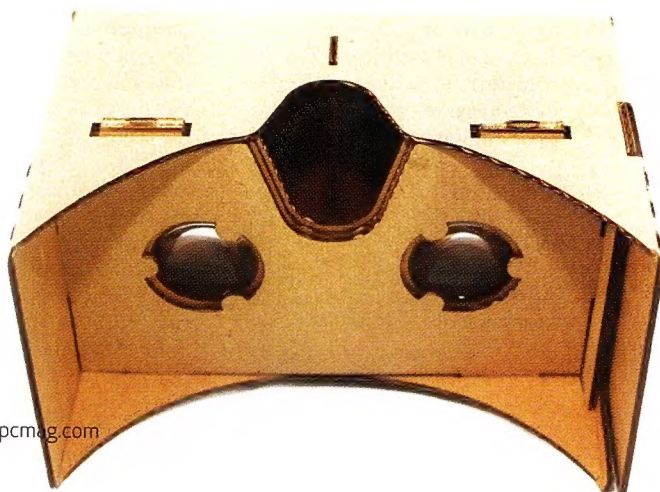
■ Matt Bolton



Google Cardboard

How to look cheaper than a 'Glasshole'...

No, it's not an April fool's joke and the Oculus Rift team has nothing to fear — the low-fi creation you see above is just Google's first foray into the world of virtual reality, dubbed Cardboard. Unveiled at its recent Google I/O developers conference and gifted to attendees, as the name suggests the headset is primarily made out of cardboard, plus a couple of plastic lenses, and makes use of an Android phone for generating the VR display. To be fair, this isn't an entirely bad idea — it could help expose more people to real working VR tech and help spur on development. Modern smartphones' exceptionally high-res screens also make them prime candidates for use in VR, where close proximity to your eyeball means you want the smallest, most tightly-packed pixels possible. Those who've tried Cardboard have said that it's an interesting experiment, but one where the phone can be the weak spot — the lag between physical movement and that translating to the screen isn't quite swift enough to make the illusion convincing. If you want to build your own, you can check out the plans at g.co/cardboard. And as you're wearing it, remember that while you may look silly, that's a small price to pay for living in the future, man!



THE UPS AND DOWNS OF SOCIAL NETWORKING

Facebook provides another reminder that free doesn't necessarily mean 'without cost'.

Social networking giant Facebook's weathered a lot of criticism over user privacy in the course of its 10 year history, but its latest antics in conjunction with Cornell University in California — subjecting a random selection of its users to a mood experiment — could potentially see it in legal hot water in the UK and Ireland. The experiment, which ran back in January 2012, scanned the feeds of around 700K users looking for status updates with either positive or negative words. Facebook then used the results to adjust what the test subjects saw in their feeds, showing half the users mostly positive updates and the other half mostly negative ones. While the results were genuinely enlightening — the study showed that, in their own status updates, each group went on to repeat either the positive or negative mood they'd been exposed to — and Facebook claims the study was legal and never directly exposed user data to researchers, the Irish Data Protection office and Britain's Information Commissioner are both investigating whether the study involved any breach of data-protection laws. Facebook's end user license agreement contains clauses that state it is allow to access user data to conduct research studies such as this one.

We guess there is one positive outcome to the whole thing — Facebook has finally proved that happiness is indeed contagious. Oh and also that, unless you're genuinely depressed, you should try and avoid being a downer on social networks. You can read and abstract on the study — tantalisingly titled 'Experimental evidence of massive-scale emotional contagion through social networks' — by heading to tinyurl.com/nogkqne.

ROFLING AT THE FBI

In a story that had APC staff asking, 'Haven't they heard of Urban Dictionary?' it's been leaked that the FBI has compiled a list of internet shorthand and acronyms to help its staff make sense of the growing online phenomenon. The document, titled 'Twitter Shorthand' suggests staff may find the 2,800 entries "useful in your work or for keeping up with your children and/or grandchildren". Proving that you can always learn something new, we've collected a few highlights that APC's tech experts didn't know: 4SRS ('for serious?'), BAMN ('by any means necessary'), DPYN ('don't pick your nose'), GFAK ('go fly a kite') and our personal favourite, IITYWTMWYBMAD ('if I tell you what this means will you buy me a drink'). Oh and we shouldn't forget to mention the always useful IHA ('I hate acronyms'). You can grab the full list as an 85 page PDF here: tinyurl.com/odws9cs.

Have a need for speed?



Looking for a wireless router that delivers super-fast speed?

How does wireless speeds as fast as 1.3 gigabits per second sound? Well, hold onto your seats because Billion's new BiPAC 8800AXL wireless AC broadband router offers just that! Based on a Broadcom chipset, the BiPAC 8800AXL supports ADSL2+ and is fibre-ready, using an Ethernet Wide Area Network port to hook into the NBN as soon as it comes to your house. It also has four additional Gigabit Ethernet ports plus two USB 2.0 ports, allowing for 3G/4G modem connectivity, print serving or Network-Attached Storage.

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- ultimate wireless speed 300+1300Mbps
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- QoS for traffic prioritisation and bandwidth management

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current
Wireless N
protocol**

**Speeds up to
1.3 gigabits
per second**

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